UNITED
NATIONS

A

General Assembly

Distr.
GENERAL

A/CONF.151/PC/70
26 June 1991

Original: ENGLISH

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August - 4 September 1991
Working Group II
Item [2] of the provisional agenda

GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. At its first session, the Preparatory Committee in its decision 1/20, paragraph 3, invited the United Nations Environment Programme, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, and the World Meteorological Organization to study ways and means of strengthening observation systems to protect oceans, inter alia, through the establishment of a global ocean observation system.

2. In response, IOC has prepared the following report in co-operation with UNEP and WMO.

II. PRESENTATION

A. Purpose

3. A Global Ocean Observing System is necessary for the adequate analysis and prediction of the state of the marine and coastal environment and its interaction with atmospheric and terrestrial processes essential to life on this planet. Sustainable development of any kind is unachievable without

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basic information concerning resources and environmental conditions and reliable forecasting capabilities. Information on emerging environmental problems and capabilities to effectively address potential environmental impacts are virtually non-existent at the present time in most parts of the world. A Global Ocean Observing System will include the collection, analysis and distribution of data and related products from the oceans, enclosed and semi-enclosed seas and coastal areas according to a globally-coordinated scientifically-based strategy. Because of the special vulnerability of coastal waters to adverse effects of human activities and because of the large socio-economic benefits derived from coastal regions, observations will be concentrated in these areas.

B. The Role of the Ocean in Global Change and its Impact on Economic Development Potential

4. Today's environmental problems stem from insufficient attention to the need for environmental protection in the course of economic development. Often such inattention has been and is presently caused by a fundamental lack of knowledge of the effects of human activities on our earth's natural resources. We do not yet know how to accurately predict the future state of the environment, to effectively analyse the increasing amounts of data on the global ecosystem, and to wisely determine the appropriate balance between economic development and environmental stability.

5. The oceans, covering 71 per cent of the earth's surface, have played and will continue to play a decisive role in shaping the life on this planet. The global energy budget and the biogeochemical processes on which all life depends are critically influenced by the oceans.

6. The oceans and coastal terrestrial areas interact intimately. The ecological systems of the coastal areas, as well as the socio-economic development of these areas, are heavily influenced by the conditions created by the proximity of the oceans. Nowhere is this mutual interdependence and influence so evident as in the coastal and near-shore zones of enclosed and semi-enclosed seas, and on islands. Population density and population growth are highest near the coastal zone. By the year 2000 it is estimated that 75 per cent of the global population will live within 60 kilometres of the coast (United Nations, 1985). The nature and causes of present problems of coastal and ocean management are also discussed extensively in UNCED Document 5, Climate Change Impacts.

7. Due to the natural resources found in coastal and near-shore areas, these regions have been among the most intensively used parts of the planet since ancient times. Our use of the coastal zone is multi-faceted: fisheries (80 per cent of the world's fish supply comes from within 9 kilometres of the coast), settlement, large-scale industrial development, tourism and recreation, transportation, water discharge and waste disposal. There are demonstrated relationships between physical oceanic processes, biological activity, and fish stock recruitment; between nutrient enrichment and excessive algal blooms; between the quality of mariculture products and water quality conditions, to name a few. Changes in sea level and shoreline exposure to waves and storm surge can have a major consequence on the value of coastal lands.

8. Coastal zone management, with development policies integrated with policies for management of the environment and its resources, is today accepted as an effective framework for addressing the environmental problems of coastal areas. However, knowledge and understanding of the severity of the problems is a prerequisite. The concept of integrated coastal zone management and associated issues are described in detail in UNCED companion Document 2, Development of Coastal Areas and Enclosed Seas. It urges that attention be given to increasing our understanding of ocean processes for effective coastal zone management and notes that inadequate information on which to base decisions has been one reason for limited application of this concept to date. Hence, implementation of this concept will benefit directly from a Global Ocean Observing System.

9. Environmental degradation of coastal areas and increases in pollution of near-shore waters are occurring at an alarming rate. Enclosed and semi-enclosed seas are especially vulnerable. Coastal waste management policies must be based on a knowledge of the ecological effects of wastes in an effort to ensure that unacceptable effects do not occur. There are, however, some encouraging examples of areas where management measures have led to improvements such as the Thames Estuary (increased dissolved oxygen), the coast of California (particularly reduction in levels of DDT) and Japanese waters (particularly reductions in the level of toxic metals). These improvements became possible when sufficient observations were available to define the problems, to delineate the causes and to demand remedial actions.

10. Potential effects of climate change will aggravate present problems and add another dimension to their complexity. Some impacts of global warming in coastal areas can be anticipated now, for example, sea level rise and especially extreme events such as storm surges. Low-lying countries and small islands are particularly vulnerable to inundation. World leaders have agreed that the severity of the problem requires attention now. Response options are being considered. Such decisions should be based on the best possible scientific understanding and predictive information concerning the rate and magnitude of change.

11. The oceans play a major role in the Earth climate system. They moderate seasonal variations; they store and transport large amounts of heat, resulting in interannual climate variations; and they are a major factor in the biogeochemical cycles of greenhouse gases. The ocean drives the global cycle of evaporation and rainfall. Any possibility of predicting climatic changes beyond a few weeks demands that ocean conditions also be taken into account. While considerable progress is being made in understanding the role of the ocean in climate variations, more attention must be given to observations of properties and processes in the upper ocean, in the mid-depth regions and at great oceanic depths to improve climate predictability. Document 5, Climate Change Impacts, provides further details on the role of the oceans.

12. There are substantial socio-economic benefits to be derived from improved predictability of ocean conditions and processes. Forecasts of winds, temperatures, waves and currents for periods of days to weeks into the future will increase the efficiency and safety, and reduce the costs, of maritime operations such as fishing, ship routing, offshore oil and gas operations,

hazardous spill response and search and rescue operations. Interannual climate forecasts of seasons to several years will benefit agricultural planning, fisheries management and energy management. Reliable assessments of climate change over several decades will be useful in coastal facility design and construction and in projection of long-term energy requirements.

13. Observing, understanding and predicting environmental change are required to establish the socio-economic impacts for management and development purposes and the long-term policies to mitigate the undesirable effects of such changes. The lack of systematic long-term observational data on a global and regional scale substantially limits predictive capabilities today. Nations are being called upon to cooperate in a comprehensive effort, according to a globally coordinated strategy, to determine ocean processes and changes in the state of the marine and coastal environment and interactions with atmospheric and terrestrial processes. Only a globally applied strategy will contribute to a long-term solution.

III. SITUATION ANALYSIS

A. Impacts of Environmental Change on Economic Development: The Economic Value of Adequate Assessments and Predictions

14. Environmental change has fundamental implications on economic development. The types of oceanic changes that serve as environmental indicators and may produce adverse impacts include:

- Sea level change
- Changes in upper ocean temperatures affecting fish stocks
- Changes in locations of upwelling zones affecting fish stocks
- Changes in storm paths and storminess
- Changes in sea ice distribution
- Possible changes in major ocean currents such as the Gulf Stream and Kuroshio Current

15. Other changes that can serve as early warning systems include incidents of coral bleaching and changes in plankton distributions or plankton structures.

16. The most recent climate change forecast, adopted by the Second World Climate Conference, predicts a sea level rise of 65 centimetres plus or minus 35 centimetres by the end of the next century. A one meter rise in sea level could affect all land up to five metres in elevation. A total of five million square kilometres is at risk, 3 per cent of the world's total land but one-third of global cropland and home to one billion people. Although no comprehensive studies have been undertaken, site-specific studies suggest that incorporating projections of sea level rise and other environmental changes into land-use planning can save significant amounts of money. Land-use policies, building codes, etc., can be modified if adequate long-term predictive information is available. Sea level rise will also impact on fresh water supplies for human consumption and agricultural irrigation. Oceanographic observations to improve forecasts for pollution purposes, commercial fisheries development, and weather changes also result in considerable economic benefits.

17. The IOC, WMO and UNEP have gained considerable experience in operational global environmental monitoring systems such as the World Weather Watch (WMO), the Integrated Global Ocean Services System (IOC-WMO), the Global Sea Level Observing System (IOC) and the Global Investigation of Pollution in the Marine Environment (IOC-UNEP). The economic benefits derived from the World Weather Watch are estimated to be 100 times greater than the cost of the system. Meteorological services, which depend upon data describing ocean conditions, are an essential contribution to the economic well-being of almost every country. Timely warnings of severe or hazardous weather or flooding help to protect life and property and facilitate commerce, agriculture, energy, transportation and water use activities. Examples of economic benefits include timely warnings of typhoons in Eastern Asia which allow thousands of fishing vessels to take shelter and rice to be harvested before damaging weather commences. In China recent timely forecasting of typhoon rains allowed 38 dams and reservoirs to be opened before flooding occurred, and the resulting lack of damage to the dams saved an estimate $US 286 million. Although forecasts are at times accurate, in the case of the devastating May 1991 Bangladesh cyclone for example, severe weather warnings are frequently not given due to the lack of data and the need for predictive modeling capabilities. It is essential that such service be available world-wide and, most importantly, be reliable.

18. Significant changes in sea surface temperature identified in the central and eastern tropical Pacific together with systematic variations in atmospheric pressure in the Southern Hemisphere have been termed "El Nino" Southern Oscillation (ENSO) events. In 1982-83 effects of the strongest ENSO event of this century were felt world-wide and were not limited to weather. The marine ecosystem in the central and eastern equatorial Pacific experienced the most direct consequences, such as the migration southward of the coastal fisheries to avoid the warm water. One of the most dramatic earlier consequences was the catastrophic collapse of anchovy stocks off the coast of Peru due to the El Nino of 1972-73. The resulting overfishing caused repercussions throughout the world commodities markets. Important indirect or secondary effects have been noted in other locations world-wide. For instance, during the 1982-83 El Nino, there were huge drought-related fires in Borneo and Australia, drought-related eradication of sea-bird populations on islands in the Pacific, drought-related famines in India and east Africa, and flooding on the east coast of equatorial South America, in the Rocky Mountain region of the United States and in Brazil south of the equator. With adequate data, predictions can be made which would serve as an early warning system to minimize these adverse effects.

19. The impacts of marine pollution on economic development are well known. The costs of adequate waste disposal are substantial, but the costs are far greater of polluted waters affecting the health of coastal populations. A well-designed system for monitoring suspected pollutants is a prerequisite.

B. Recommendations of the Intergovernmental Panel on Climate Change

20. The Intergovernmental Panel on Climate Change (IPCC) was formed by the United Nations Environment Programme and the World Meteorological Organization in 1988 to provide a basis for the development of a realistic and effective

international strategy for addressing climate change. Reports of the three IPCC Working Groups have been completed; independent conclusions of each group call for an ocean monitoring program in order to narrow the uncertainties, to address the impacts, and to identify appropriate response strategies.

21. The IPCC has recognized the need for systematic ongoing observations of the global ocean and has recommended the development and implementation of multi-national systems to detect and monitor ocean and coastal zone changes and environmental and socioeconomic impacts of those changes. The IPCC June 1990 report called "Scientific Assessment of Climate Change" states that "systematic ongoing observations of the global ocean are needed" and "a comprehensive ocean and ice observing system requires:

(a) satellite observations of the ocean surface temperature, wind and topography, sea-ice concentration and chlorophyll content (ocean colour), and of the topography of the Antarctic and Greenland ice sheets, by an international array of space platforms in suitable orbits around the earth;

(b) an international operational upper-ocean monitoring programme, to determine the time and space dependent distribution of heat and fresh water in upper ocean layers, seasonal variations and long-term trends; and

(c) an international program of systematic sea-level and deep-ocean measurements, at suitable time and space intervals, to determine the state of the ocean circulation, ocean volume, and transport of heat."

22. The Fifth Plenary Session of the IPCC (Geneva, 13-15 March 1991) noted the widespread and urgent requirement for predictions of the regional distributions of climate change but determined that major improvements in the level of confidence of regional predictions would take 5-10 years. Work must begin now to develop an integrated ocean observing system, it noted, to support regional models.

C. Recommendations of the Second World Climate Conference

23. The Scientific and Technical Sessions of the Second World Climate Conference in October 1990 identified an urgent need to create a Global Climate Observing System to be built on:

- An improved World Weather Watch Programme and further development of the IOC-WMO Integrated Global Ocean Services System
- A Global Ocean Observing System of physical, chemical and biological measurements
- A monitoring programme of other key components of the climate system.

Both satellite and surface ocean observations will be included.

D. United Nations, IOC and WMO Resolutions

24. In response to the United Nations General Assembly Resolution on the Protection of Global Climate for Present and Future Generations of Mankind and recommendations made by Working Groups of the Intergovernmental Panel on Climate Change, the Intergovernmental Oceanographic Commission (IOC) has initiated development of a comprehensive Global Ocean Observing System (IOC Resolutions XV-4 and XXIII-5). The World Meteorological Organization (WMO) passed a similar resolution in 1989 to cooperate with the IOC on this initiative. The 16th Session of the IOC Assembly in 1991 decided to establish a GOOS Support Office within the IOC Secretariat and invited WMO, UNEP, the International Council of Scientific Unions, and the Committee on Earth Observations Satellites to cooperate with IOC in the planning and development of the GOOS. It also passed a resolution (XVI-16) to submit a Declaration to UNCED, described in Annex 1, in order to foster support and participation in GOOS among all United Nations Member Nations. Subsequently, the World Meteorological Congress in 1991 adopted a resolution supporting the IOC initiative and agreeing to cooperate in the planning and development of GOOS.

25. The IOC Sixteenth Assembly also endorsed the establishment of a GOOS Planning Staff within its Secretariat to develop and co-ordinate plans for GOOS and serve as a focal point. Additionally, it endorsed the creation of a Steering Committee and a Planning Office for a Global Climate Observing System and pledged to include appropriate oceanographic expertise for that effort.

E. Definition of GOOS

26. GOOS is being developed as a comprehensive, integrated system for collecting, analysing and distributing physical, chemical and biological data from the world ocean, including the coastal zone and enclosed and semi-enclosed seas. It will facilitate the protection of the ocean from degradation and alteration of marine ecosystems through increasing our understanding, improve our predictive capabilities and provide predictions of the physical state and health of the ocean and its role in environmental change and economic development. It is to serve as an early warning system. It will provide consistent, long-term data sets through a sustained permanent effort and help predict climate variability and change. GOOS should ultimately be able to supply the data required to support the evaluation of natural and anthropogenic climate changes and the long-range forecasting of weather and climate, as well as regional predictions of ocean conditions for fisheries, coastal zone management, and pollution assessment.

27. GOOS will be developed on a sound scientific basis, taking full advantage of the findings of global research programs. GOOS will be built as far as possible on existing national and international ongoing and planned programmes and capabilities and must be continually updated and improved in response to new results of these national and international research programmes and the development of new technology. The focus is to be on improving coordination and accelerating expansion of existing international ocean observing and data management systems (descriptions of which are given in Annex 2). Close interaction with the scientific community is a prerequisite for the design,

planning and development of a scientifically sound and cost-effective global system. Descriptions of key global research programmes are given in paragraph 2.8.2 below.

28. GOOS is to be analogous in some respects to the World Weather Watch of WMO and will include, inter alia, a large range of national ocean observation systems, from which a subset of data will be identified as required for global exchange and management. GOOS will build on the Integrated Global Ocean Services System, a joint IOC-WMO activity for the collection and exchange of surface and sub-surface temperature, salinity and current data.

Categories of data required for GOOS include:

- Upper ocean measurements to determine the time and space dependent distribution of heat and fresh water, sea level, carbon dioxide content, air-sea fluxes and plankton distribution

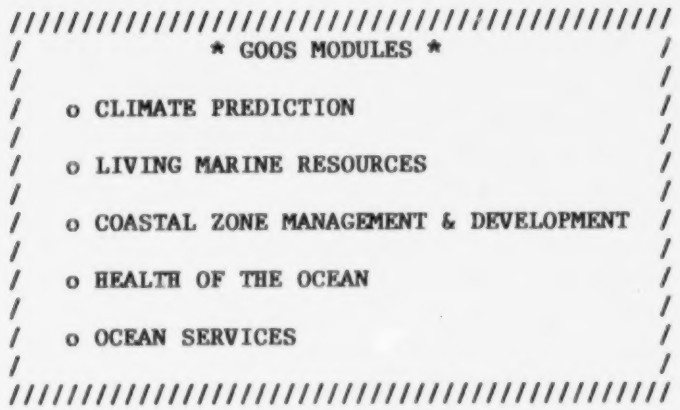
- Systematic deep ocean measurements at suitable time and space intervals to determine the state of ocean circulation, physical and chemical properties, transient tracers and carbon dioxide

- Satellite observations of ocean surface temperature, wind, sea surface elevation, precipitation, sea ice concentration and chlorophyll content (ocean colour) by an international array of space platforms in suitable orbits around the earth

29. Real-time acquisition, reporting and dissemination globally of data from throughout the world ocean, including coastal zones, enclosed and semi-enclosed se s, will be necessary. Specific requirements for space and time resolution and accuracy of measurements will be derived from present global research programmes.

30. Satellite measurements will be extremely important. Fortunately the opportunity for increased satellite earth observation data exploitation is tremendous. Figure 1 depicts a map of a hypothetical future GOOS network. By the year 2001 the volume of satellite data available will increase by two orders of magnitude. Recent advances in satellite data processing capabilities also allow expanded utilization of satellite data.

31. Different elements of GOOS required for climate prediction, coastal zone protection, observation and assessment of living resources, observation and assessment of the health of the ocean and improved ocean services for various national practical applications will be encompassed in subsystems or "modules". Each module will address a set of specific objectives or requirements and will be incorporated into the comprehensive system on the basis of our improved knowledge of ocean processes and the interaction between the oceans and atmosphere and coastal terrestrial areas and other characteristics of the marine environment. Local and regional coastal studies need global input. It is extremely important that the modules be developed in close harmony, both nationally and internationally. Data acquired for one module can also be used concurrently for another so there will be no duplication of effort.


* GOOS MODULES *
o CLIMATE PREDICTION
o LIVING MARINE RESOURCES
o COASTAL ZONE MANAGEMENT & DEVELOPMENT
o HEALTH OF THE OCEAN
o OCEAN SERVICES

a. **The Climate Prediction Module**

32. One of the initial priorities is the climate module. This module of the GOOS will provide the ocean data needs of the Global Climate Observing System. Initial results from the Tropical Oceans Global Atmosphere Research Programme, conducted between 1985-1995, indicate that an operational observing system for selected tropical regions can be implemented by the year 2000. It is critical that research programmes proceed as planned in order to properly establish this module. These programmes include the Tropical Oceans-Global Atmosphere Programme, the World Ocean Circulation Experiment, and the Joint Global Ocean Flux Study.

33. Operation of this module will result in reducing the uncertainty that now exists with regard to the role of the ocean in the timing and patterns of climate variability - seasonal, interannual and decadal. It will provide the input and validation data for coupled air-ocean models. Sampling strategies will have to be defined on the basis of the results of large-scale ocean climate research programmes. One illustration of the challenges faced by the climate module of the GOOS is that optimally measurements of the ocean-atmosphere heat flux are needed to within ± one megawatt per square kilometre. This is the approximate magnitude of the anthropogenic greenhouse enhancement. This signal must be determined from a highly variable background heat flux which is about 100 times larger. Observations will be required to determine the deep ocean circulation in order to understand inter-basin fluxes as well as the seasonal boundary layer. Dynamic changes inside the ocean - at all depths - must be known in order to predict future changes in surface temperatures which provide the boundary conditions for the atmosphere.

34. A plateau in coupled ocean-atmospheric model development will soon be reached without more complete ocean data sets. The design of GOOS includes the concept of interdependence between observing system and model. One or more global ocean data analysis centers may be required. In such an analysis center ocean data could be used for both model and observations system development. This mutual feedback concept is considered essential.

35. Models of coastal ocean processes also need to be greatly improved in order to adequately forecast local and regional climate variability. Systematic data collection needs to be undertaken to improve forecast capabilities of ocean models at basin or smaller scales. The potential increase in data will demand increases in computing capability and further attention to quality control and data exchange protocols.

36. The climate prediction module of GOOS along with the other elements of the Global Climate Observing System will provide the basis to forecast ENSO conditions and possibly the seasonal monsoons.

b. The Living Marine Resources Module

37. Despite research over the past several decades, we have little knowledge of the effects of ocean behavior on living marine resources. The ability to ensure sustainable harvesting of fisheries stocks depends on adequate knowledge and predictive capabilities. Companion Document 4, Living Marine Resources, emphasizes the importance of interdisciplinary work to reduce the present uncertainty in the field of marine resources management. This module of GOOS will include pelagic and benthic sampling while concentrating on observations of ocean features such as coastal upwellings and circulation, for example, that are known to substantially affect production. This module will also provide the oceanographic data necessary for ecosystem models of fish stocks for local and regional predictive needs. Data are needed to describe the structure and functioning of marine ecosystems. To understand biological processes, it is essential to know many oceanic and atmospheric parameters that form the dynamic matrix in which these processes take place. Physical processes in the upper 100-200 metres of the ocean dominate many problems in biological oceanography.

38. Specific requirements, sampling strategies and techniques for this module will be determined in cooperation with the Food and Agriculture Organization (FAO) within the joint IOC-FAO Programme on Ocean Science and Living Resources.

c. The Coastal Zone Management and Development Module

39. The GOOS coastal components have a high priority to many coastal states because of the intimate effects of coastal changes on economic development. Monitoring and documenting changes in coastal and near-shore areas requires a global and an interdisciplinary approach that integrates physical, chemical, biological and geological observations with socio-economic uses of the coastal zone.

40. UNEP, IOC, and WMO have developed a proposal for long-term monitoring in the coastal zone as one module of the Global Ocean Observing System. The proposed system ensures that measurement frequency, spatial resolution, and parameter selection will be adequate in the area most likely to be affected first by anthropogenic influences, and it will also complete the suite of observations necessary for global numerical models. In coordination with the UNEP Regional Seas Programme and IOC regional bodies, the system will draw on existing and planned data collection and exchange systems, adding complementary measurements not now taken such as biological and chemical

observations. Emphasis will be placed on strengthening national infrastructures to utilize data at the local and regional level, to assess change and its impacts and to facilitate establishment of policies to mitigate undesirable effects. A series of pilot projects has been suggested to measure key variables over a three-year test period. These variables include:

- o Sea level changes and coastal flooding
- o Coastal circulation
- o Assessment of organic carbon accumulation in coastal sediments
- o Changes in plankton community structure
- o Benthic communities; coral reef ecosystems
- o Terrestrial vegetation; mangrove communities

41. Consideration is being given to the support of the ongoing study of "large marine ecosystems" for the organization of some coastal aspects of GOOS. A total of 48 large marine ecosystems have been characterized to date. These regions, measuring 200,000 square metres or greater, have distinct hydrographic regimes, submarine topographies, and biological productivity. They could be a particularly useful definition for monitoring holistically the health of the ocean on a regional basis. IOC has established seven regional subsidiary intergovernmental bodies; UNEP manages 12 Regional Seas Programmes; and WMO has 6 Regional Associations. These elements will be used in the management aspects of GOOS.

d. The Health of the Ocean Module

42. Companion Document 3, Marine Pollution Control Strategies, points out that most human activities affect the ocean. Global strategies are essential if all elements of the marine environment are to be protected. The extent of existing pollution problems is not well-known globally, however, because of the lack of efficient, comprehensive monitoring and assessment activities in most regions of the world. While the Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) concluded in 1989 that open ocean areas are relatively free of the effects of pollution from land- based sources, coastal areas are, however, suffering. The lack of knowledge of the status of the marine environment frequently results in extreme impacts, as seen, for example, in the recent outbreak of the cholera epidemic in Peru which to date has killed 1200 persons. Because of the transboundary nature of marine pollution, dependence on national programs alone is inadequate. Additionally many countries lack the basic infrastructure. Regional assessment programs have been shown to be successful as in the case of the Mediterranean region where contracting parties agreed in 1976 to conduct a permanent monitoring system under the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution.

43. This module of GOOS aims to establish a framework for measuring trends in levels of pollutants, including development of baseline data sets and quality control standards, provision of technical assistance and development of central data bases. Data collection and analysis is to be based on proven scientific methodologies. The monitoring and assessment capabilities thus developed will serve the needs for effective national and regional

implementation of the United Nations Convention on the Law of the Sea and provisions of the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources.

44. Strategies and techniques for assessing pollution levels is being determined by a joint IOC- UNEP programme called Global Investigation of Pollution in the Marine Environment (GIPME) and related IOC and UNEP activities such as the UNEP Regional Seas Programme and Marine Pollution Monitoring (MARPOLMON). Studies of selected pollutants must be based on the use of unified methods and technologies so that results are intercomparable. This module will include regional components with specific observational networks, geared to problems of each region.

45. At present, pollution monitoring is accomplished mainly through routine sampling and analysis based on periodic ship cruises. However, developments in instrumentation and methodologies envisaged under GOOS will afford greatly improved large-scale and repetitive real- time data, especially for those parameters that vary rapidly in time and space. By affording real-time data to the GIPME programme, GOOS will considerably enhance response effectiveness in the case of pollution incidents, such as accidental oil or chemical spills.

46. This module of the GOOS will provide basic information on the transport and fate of pollutants in the ocean with primary emphasis on nearshore regions. It will enable more effective and efficient responses to accidental releases of hazardous materials to the ocean. The release of oil during the Gulf War, the Exxon Valdez oil spill off Alaska, and the release of radionuclides into the Black Sea from the Chernobyl accident provide examples in which knowledge of coastal processes is needed to minimize the impacts on marine ecosystems of pollutant releases.

e. The Ocean Services Module

47. Marine meteorological and surface oceanographic data from most ocean areas are extremely important for basic short to medium range weather predictions along with effective response procedures. Improved warnings of severe weather and extreme weather events would save thousands of lives per year. On a time scale of more than a few days, the prediction of weather is not possible without some knowledge of the state of the upper ocean. Marine meteorological and surface oceanographic data contribute to the safety of life at sea, to the economical operation of shipping, to tourism and recreational opportunities, to seabed exploration and coastal engineering. This module of GOOS will focus on increasing the amount of data for immediate real-time forecast needs. Requirements for marine meteorological and surface oceanographic data in support of short-range weather prediction and related services have been defined by the World Meteorological Organization's World Weather Watch.

f. Products

48. With data obtained through GOOS, products can be prepared for economic and commercial applications by participating countries. Forecasts and analyses of meteorological, hydrological and maritime conditions can be made

based on products describing ocean features such as sea surface temperature, ocean current and heat flux. Products must be quickly and easily available, up-to-date, have sufficient spatial detail to show major ocean fluctuations. Some products will be "blended", using a combination of conventional (in situ) data and satellite data.

49. An example of such products is a potential set of global ocean climate diagnostic charts based on observations that have been assimilated into a numerical model. This information is potentially extremely useful for agricultural planning, for instance. Another example is analyses of local and global sea level trends, seasonal variations and identification of anomalously high or low levels occurring in particular areas. GOOS products will also support assessments in the case of the accidental release of hazardous materials into the ocean. Such events require a rapid exchange of marine environmental information and the provision of specialized products indicating the transport, dispersion and deposition of hazardous materials and effects on marine ecosystems and coastal zones.

50. Fishermen can use GOOS products to better understand past, present and predicted ocean conditions for locating fish populations. Short-term forecasts can affect decisions on the day-to-day movement of individual vessels and best operating depths. Effective management of fishery resources requires information on past, present and future status of stocks which are directly related to oceanographic conditions.

51. Marine meteorological and oceanographic products benefit the economy, efficiency and safety of shipping operations. From information provided on winds, ocean currents, surface and sub-surface temperatures and salinity, the growth, decay and movement of sea ice and icebergs can be forecast.

g. Funding Requirements

52. The total annual costs for a fully implemented Global Ocean Observing System have not been established. Most projections suggest that it will take about two decades of development and evolution to obtain the system outlined in the preceding sections. Some resources for the GOOS are already anticipated by ongoing and planned progammes, but there will be additional incremental costs to achieve the observational capability required in the marine environment.

53. Woods (1990) provided one estimate and rationale for the level of resources required to support the ocean services and climate modules of GOOS. He assumed that the global investment in GOOS should be about the same as what the nations of the world presently devote to weather prediction observations through the World Weather Watch, which is about $US 2 billion per year. He also estimated that about one-half of the expenditures would be needed for observations from earth orbiting satellites. The other half would be required for measurements within the ocean and for data processing, management and distribution. The table below gives Woods estimates.

	Unit Life years	Capital $m/y	Running $m/y	Total $m/y
Space Observations				
4 small satellites	5	480	160	640
4 large satellites	5	480	160	640
Ocean Observations				
100 autosubs	3	80	180	260
Acoustic remote sensing	3	90	90	180
Drifting instruments	2	66	14	80
Fixed instrument	2	26	26	52
Data Management				
Communications	5	100	100	200
Computing	5	100	100	200
Archiving		100	100	200
TOTAL		1522	930	2452

54. Development of autonomous instrument technology to replace measurements taken by ships is seen as a method of reducing costs and enabling a high sampling density. Data management costs include super computers to integrate the GOOS data with fine resolution models.

55. With such a system in place, annually updated descriptions of the climate of the open ocean might be produced in order to provide boundary conditions for predictions of coastal water quality and fisheries. Thus, this sub-system of GOOS, while designed for climate, has immediate and local economic applications.

56. It is estimated that present oceanic observational systems (described in Annex 2) cost $US 50 million per year. Research programmes are the major source of this funding. It is essential that GOOS be established with operational funding, as a long-term service rather than depend upon data collection efforts of research activities that have definite durations.

57. The costs to support a Global Ocean Observing System will be shared by those nations that benefit from it through participation in national, regional and global programmes.

h. National Capabilities

58. National institutions responsible for marine environmental protection need to be established or strengthened in many countries. Their influence on national development planning needs to be enhanced. Without creating strong national infrastructures, equipped with interdisciplinary scientific expertise, and without access to decision-making authorities, no effective protection and integrated management of the coastal and marine environment can take place.

59. The global and long-term nature of GOOS requires the active involvement of many countries through national services and facilities based on the principle that each country participates, according to its means, to meet certain responsibilities in the agreed global scheme, so that all countries may benefit. Substantial training, education and mutual assistance efforts must be undertaken to enable developing countries to actively participate in GOOS and to interpret and apply effectively the resulting data and information for national uses. The establishment of regional consortia to address some aspects of GOOS may be a cost-effective way to implement an observing system.

60. Exchanges of technology and products must be encouraged, and the concept of partnerships between developed and developing countries must be fostered. Companion Document 1, Capacity Building, presents a detailed discussion of the importance of technical assistance as a fundamental ingredient in a long-term strategy for strengthening national capabilities. It points out that few countries now have adequate information on the state of their coastal and marine resources but such information is essential for sustainable economic development of these resources.

61. The protection and development of seas and coastal areas require a variety of expertise and a full recognition of the cross-sectoral nature of environmental protection. While narrow, sectoral expertise exists in most countries, great efforts should be devoted to the training of experts in interdisciplinary skills.

62. Because of the need for data from all ocean areas and the value of such data to all nations, GOOS will depend critically on the free and open exchange of data. High priority is placed on the establishment, maintenance, validation, description, accessibility and distribution of high quality, long-term data sets. Data should be available for no more than the cost of reproduction and distribution.

63. A great deal of data now exists which is not readily available or centrally archived, pointing to the need for increased attention to national, regional and international inter-agency cooperation in data management. Data sets need to be inventoried, data bases need to be standardized and information about data needs to be readily accessible. Examples of coastal zone data sets and analyses which exist but are not readily available are described in UNCED Document 5, entitled Climate Change Impacts.

i. Status of Implementation of GOOS

64. The following section describes ongoing ocean observation and data management efforts. Additional information on these activities is given in Annex 2. In order to make data readily available for accurate assessments of the marine environment, these activities will need to work closely together. GOOS is seen as an evolving effort which will coordinate and may ultimately merge a number of these systems to facilitate the rapid exchange of information and preparation of products and environmental indicators.

a. Status of Implementation of Existing Systems

65. Regular oceanographic and marine meteorological observations have been made for many years, mainly in limited coastal and near-shore areas. These efforts support fisheries, coastal zone management, and preparation of forecasts of sea-ice and natural hazards, such as storm surge and tsunami events. The first international collaboration to obtain weather observations over the oceans started in the second half of the 19th century. As a result of such collaboration, a Voluntary Observing Ship Scheme was established under the aegis of WMO. At present the 7000 voluntary observing ships, constituting an important element of the Global Observing System of the WMO's World Weather Watch, collect and transmit in real-time surface meteorological and some ocean surface observations (including sea surface temperature, wave heights and sea-ice).

66. In the mid 1960s IOC in co-operation with WMO initiated the Integrated Global Ocean Services System (IGOSS) for the timely acquisition and exchange of oceanographic data, the provision of services and dissemination of data products. IGOSS is an operational system which relies to a large extent on the Global Telecommunications System of the WMO for real-time data exchange. The IGOSS observing system includes the use of national research ships and ships-of- opportunity, equipped with expendable and other measuring devices for subsurface measurements of temperature, salinity/conductivity and currents. At present some 200 ships (both research and merchant) from 23 countries contribute to the collection of IGOSS data. A few ships carry acoustic doppler current profilers which directly measure the vertical profile of ocean currents. The IGOSS Plan and Implementation Programme (1989-1995) calls for equipping 500 ships with automatic data formatting and reporting systems to improve the global coverage and spatial and temporal resolution of these ocean observations.

67. From the mid 1970s moored and drifting buoys and coastal sea-level stations have been deployed by some countries and data have been incorporated into the IGOSS system. In the mid 1980s WMO jointly with IOC established the Drifting Buoy Co-operation Panel (DBCP) in order to encourage and support drifting buoy deployments for meteorological and oceanographic observations. There are presently 600 drifting buoys operated by 11 countries. They utilize the Argos satellite communication and data processing system. Most of the buoys measure air pressure and/or sea-surface temperature. Of those, 35-50 per cent have their data disseminated globally via the Global Telecommunications System.

68. In the mid 1980s the IOC also initiated the development of the Global Sea Level Observing System (GLOSS) in order to provide high-quality standardized sea level data from a global network of sea-level stations. The GLOSS implementation plan calls for the establishment of 300 permanent sea-level stations for determining changes in sea-level due to global warming and patterns of ocean circulation. About 220 of the GLOSS stations are operational or committed, but about 50 of the other 80 stations are located in hazardous areas such as polar regions and isolated islands which will require special efforts and technology to establish and maintain. The submission of sea-level data from GLOSS stations to international sea-level data centres on a timely basis is an important factor in making these data useful.

69. International exchange of oceanographic data is presently carried out through operational channels of communication and the use of satellites, coastal radio stations and the Global Telecommunications System. Since 1960 IOC in co-operation with the International Council of Scientific Union's World Data Center (WDC) system has continued the development of the International Oceanographic Data and Information Exchange (IODE) system for the delayed mode exchange of data between national and international centers. The various oceanographic data sets (physical, biological, chemical and geological) are exchanged freely and archived in 3 WDCs for oceanography. Forty countries have established National Oceanographic Data Centres/Designated National Agencies. A number of international centres have been established to assist the international oceanographic community to collect, process and analyse certain types of data and/or to provide certain services in support of international research and monitoring programmes. They include also Global, Specialized and National centers for IGOSS. The use of standard formats facilitate data exchange. In addition to magnetic tapes, some countries have recently begun to use compact disks to store and exchange data. This technology provides new opportunities for many developing countries to access global and regional data sets and products.

70. Satellite observations, which began just over 30 years ago, have a special importance over the oceans. Currently polar orbiting satellites are operated by France, India, Japan, the United States and the USSR. Geostationary meteorological satellites are operated at different locations over the equator by the European Satellite Consortium countries, India, Japan and the United States. Each of these satellites carries a variety of sensors allowing derivation of sea surface temperature, atmospheric pressure, and cloud temperature. They also provide a substantial capacity for data relay of surface observations. Twenty polar-orbiting satellites or satellite series with the capability to support marine meteorology and physical oceanography are planned for launch during the decade of the 1990s. Satellite series equipped with scatterometers, altimeters, visible and infrared radiation, passive microwave and synthetic aperture radar devices will provide global coverage of critical surface variables, such as sea level, waves, sea-ice, wind stress, sea surface temperature, radiation, precipitation and surface water chlorophyll concentration. It is expected that by the year 2001 the volume of environmental satellite data available will increase by two orders of magnitude.

71. Analysis of existing ocean observing and related data management systems (IGOSS, GLOSS, IODE, WWW [marine meteorological component], etc.) shows that the coverage and total volume, especially with regard to subsurface oceanographic observations, accuracy and data submission, are not sufficient to meet requirements for monitoring and prediction of global climate and environmental change. The present increase of some oceanographic measurements within large-scale research programmes, such as TOGA, WOCE, and JGOFS is limited to the duration of these scientific experiments. An international cooperative effort will be necessary to provide the long-term systematic ocean observations for addressing the issues of regional and global change in the marine environment.

72. Present progress in technology for oceanographic observations as well as for processing the huge volume of data that may be expected from satellites

and other automatic systems is very encouraging. This progress now makes it feasible to develop an internationally co-ordinated long-term measurement and monitoring system built as much as possible on existing or planned national and international systems to support the preparation of accurate assessments and reliable predictions of global changes. Technical assistance will be required to enable developing countries to participate in, utilize and benefit from the Global Ocean Observing System.

A summary of ongoing activities is given in Annex 2.

b. Requirements Identified by Large-scale Research Programmes

73. Large-scale climate research programmes such as the Tropical Oceans-Global Atmosphere Programme and the World Ocean Circulation Experiment have identified the observational requirements for achieving their objectives. Although some requirements may change in the coming decades as our knowledge increases, the experience provided by these research programmes will be used to establish and refine the initial parameters, processes, features, and phenomena to be measured over the long term. Close interaction is taking place with relevant scientific groups in order to insure the sound scientific design for GOOS.

74. Requirements for long-term systematic ocean observations are being addressed by an Ocean Observing System Development Panel sponsored by the World Climate Research Programme's Joint Scientific Committee and the Committee on Climatic Changes and the Ocean (a joint activity of the Scientific Committee on Ocean Research and the IOC). This group will formulate the conceptual design of a long-term, systematic observing system in order to monitor, describe and understand the physical and biogeochemical properties that determine ocean circulation and the seasonal to decadal climate changes in the ocean and to provide the observations needed for climate predictions.

j. Institutional Mechanisms

75. Effective protection of the oceans from degradation due to human activities can be achieved only through a high level of intergovernmental cooperation. It is thus essential to strengthen and expand multilateral programmes and agreements designed to protect the marine and coastal environment according to the specific needs of the countries concerned.

76. Close coordination needs to be developed and maintained between the Global Ocean Observing System development and other climate and environmental monitoring activities of the WMO and UNEP. Such steps are being taken with the joint efforts, described above, to develop a Global Climate Observing System, of which the climate module of GOOS is a part, and a global coastal monitoring system under the auspices of UNEP, IOC, and WMO. GOOS, like the present IGOSS and drifting buoy programmes, is a joint IOC and WMO undertaking. Advice and assistance from still other organizations, such as FAO and IAEA, is being sought.

77. The GOOS system will require that operational oceanographic services be established at the national or regional level and that they work closely with

meteorological services. Participation in GOOS by virtually all maritime countries will be required to achieve the regional and global data needed to sustain the quality of the marine environment and its resources and to allow effective utilization of the oceans in economic development. Substantial efforts must be undertaken to assist developing countries in data analysis and application of data products to their goals. It cannot be overemphasized that a major new commitment will be needed from participating countries.

78. Global and regional agreements, though not universal remedies, provide a legal basis and are among the most forceful international mechanisms and signify a political commitment for joint action. Adoption and adherence to such agreements will contribute substantially to the protection of the marine and coastal environment.

79. At its Sixteenth Assembly the IOC adopted a resolution, shown in Annex 1, calling on the UNCED to adopt a declaration urging countries to support GOOS for their individual and collective benefits. In order for the GOOS system to achieve its objectives, such a cornerstone agreement for commitment, supplemented by regional agreements, will be needed and is foreseen as a catalyst for national action.

IV.ACTIONS REQUIRED

80. A major commitment needs to be made by countries to protect the oceans inter alia through the establishment of a global ocean observing system. The GOOS concept must be endorsed and implementation must proceed, in a step-wise manner, based on scientific results. We must recognize the importance of the continued health of the ocean and marine ecosystems in order to sustain life on earth and permit the sustainable development of our planet.

Specific actions needed include:

(i) Approval of the GOOS Declaration (Annex 1) by UNCED

Although not a formal international agreement, approval of this Declaration would imply:

- o Agreement by nations on the need to undertake systematic, global, operational ocean monitoring in support of several applications
- o Approval of the concept of GOOS as the appropriate mechanism to undertake this monitoring
- o Agreement by nations on the need to commit additional resources over an extended period and on a long-term basis to observe the oceans and coastal seas

(ii) Establishment of an initial plan and implementation programme for GOOS

81. This initial plan will be based on the existing understanding of requirements for systematic ocean monitoring as well as of ocean processes. It will contain priorities for the gradual implementation of GOOS and will

depend on the accelerated development and implementation of existing systems by national facilities. It will also incorporate the ocean observations to be taken by the oceanographic satellites planned for launch during the next decade.

(iii) Refinement and development of the GOOS plan, expansion of the scope of GOOS as required by new priorities

82. This refinement will largely depend on the results of the large-scale, long-term oceanographic experiments now underway or planned, as well as the development of new ocean monitoring technologies. This action is also a recognition of the fact that GOOS must be a dynamic, self-adjusting system, responsive to new requirements, new understanding of ocean processes and the development of new technologies.

(iv) Enhanced support for developing countries, to foster participation in the implementation of GOOS among these countries and in the interpretation and application of data obtained, in particular through the WMO Voluntary Cooperation Programme and the IOC Training, Education, and Mutual Assistance (TEMA) Programme

83. GOOS can be successfully implemented only through the involvement and contribution of all nations with an interest in the oceans. Appropriate mechanisms for facilitating such involvement are the assistance programmes of the IOC and the WMO. Through these programmes, support can be directed specifically to implementation of GOOS priorities. At the same time, assistance will be needed by many countries to enable them to take full advantage of the enhanced data and products to be generated by GOOS. Such needs call for greatly expanded TEMA activities in marine science by IOC and also in cooperation with other United Nations agencies and organizations.

(v) Implementation and evaluation of a series of global coastal monitoring pilot projects

84. The proposed IOC-UNEP-WMO global coastal and near-shore monitoring programme is an important initiative for coastal states, aiming toward the provision of a long-term monitoring system and data base relevant to studies of climate-induced changes in the coastal and near-shore zone. However, it is also ambitious and it is important to test both feasibility and applications of the data during a pilot phase and to carefully evaluate the results of this phase before making long-term commitments. The projects of the pilot phase should be implemented through existing mechanisms of the sponsoring organizations.

(vi) Continuation by IOC, WMO and UNEP of planning activities for the establishment and satisfactory maintenance of GOOS

85. Under the leadership of IOC, promotion of GOOS is to continue with an emphasis on effective intergovernmental coordination of relevant plans. Actions include the development of an operational GOOS Support Staff within the IOC Secretariat to promote and co-ordinate plans and activities and establishment of appropriate intergovernmental mechanisms essential for effective liaison with relevant activities including scientific programmes and the Global Climate Observing System initiative.

V. CONCLUSIONS

86. During the decade of the 1990s we have a significant opportunity and an urgent need to increase our observations of the marine environment. Advances in space-based and in situ observing technologies make it possible to determine on local, regional, and global scales changes in the oceanic system. Computer technologies and global models of the ocean and atmosphere are approaching the point where extensive data sets can be used to predict future states of the Earth system.

87. Social and economic developments over many millennia have been based on extensive use of the marine environment, and current demographic patterns show increasingly intense utilization of the coastal zone by mankind. Future development will be sustainable only if it is based on a solid understanding and predictability of marine environmental conditions.

VI. LIST OF REFERENCE DOCUMENTATION

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Annex 1

Resolution XVI-16

PREPARATION FOR THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

The Intergovernmental Oceanographic Commission,

Recalling Resolution EC-XXIII.3 on the IOC contribution to the 1992 United Nations Conference on Environment and Development,

Noting with satisfaction the active participation of IOC representatives in the work of the Preparatory Committee for UNCED and in the preparation of documentation for UNCED,

Considering the great importance attached to the development of observations and monitoring of the oceans, shelf seas, the coastal zone, enclosed and semi-enclosed seas, for climate and global change and the state of the health of the ocean and the importance of addressing all these components at UNCED,

Noting also Recommendation OPC-IV.3 of the Fourth Session of the IOC Committee on Ocean Processes and Climate on the preparation of a draft declaration for adoption at the 1992 UNCED that would encourage countries to contribute to the development and implementation of the comprehensive Global Ocean Observing System,

Emphasizes the importance of using UNCED and its preparatory committees in increasing awareness of the role of the ocean in the global environment and of the importance of ocean resources, in order to encourage national commitments to a Global Ocean-Observing System;

Approves the attached Statement and Declaration for UNCED and **requests** the Chairman of IOC to bring this Statement and Declaration to the attention of the 1992 UNCED for its adoption;

Urges Member States to bring this Statement and Declaration to the attention of their national representatives to the 1992 UNCED;

Encourages the continued development, in co-operation with WMO and UNEP, of such observations and monitoring, also seen in the context of the development of the Earth Watch System;

Instructs the Secretary to continue active IOC involvement in the work of the UNCED Preparatory Committee.

Annex to Resolution XVI-16

Statement for UNCED by the Sixteenth Assembly of the Intergovernmental Oceanographic Commission

Paris, France, 7-22 March 1991

The Sixteenth Assembly of the Intergovernmental Oceanographic Commission of UNESCO, deeply concerned with the need to improve understanding and prediction of the physical state and health of the ocean and its role in environmental change and economic development, requests the United Nations Conference on Environment and Development to consider and adopt the declaration in the Conclusion to the present Appendix.

I. Introduction

1. The oceans cover nearly three-fourths of the earth's surface and are essential to the health of life on this planet. A substantial and increasing proportion of the global population live within the influence of the coastal zone. Our understanding of ocean processes is developing rapidly through the implementation of several major research programmes. Yet we need significantly expanded data on the marine environment to understand the physical and chemical processes involved, the interaction with the atmosphere, the complex coastal, benthic and deep-ocean ecology or the anthropogenic impacts that are taking place.

2. The ocean plays a key role in determining the earth's climate. The ability to understand and predict weather and climate beyond a few weeks requires that ocean behaviour be taken into account. It may soon be possible to describe and predict many aspects of ocean behaviour with enough accuracy to improve significantly climate, weather and fishery forecasts. This achievement can be realized only if appropriate observations of the oceans are made systematically and the data and analyses disseminated promptly.

3. Global changes affect coastal areas. In addition to natural climate change and variability, present evidence of anthropogenic environmental change in the ocean and the atmosphere, involving a number of physical, chemical and biological processes, portends significant socio-economic impacts. Monitoring and predicting such changes is a prerequisite to establishing adaptive policies. Mankind's timely and effective response to changes will largely depend on the quality of information on the rate and magnitude of change at regional and global scales.

II. Intergovernmental Decisions

4. In order to address these needs, a number of intergovernmental organizations have adopted policies to respond to these challenges.

5. United Nations General Assembly Resolution 44th Session, Second Committee, 22 December 1989, states that "Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and of coastal areas and the protection, rational use and development of their living resources"

and "Protection of the atmosphere by combatting climate change, depletion of the ozone layer and transboundary air pollution" is of major concern in maintaining the quality of the global environment (A/C.2/44/L.86).

6. The Second World Climate Conference (29 October-7 November 1990) adopted conclusions and recommendations which indicate an urgent need to create a Global Climate Observing System (GCOS). The Conference Statement noted the importance of developing a Global Ocean Observing System of physical, chemical and biological measurements as one basis for a GCOS, and cited the importance of both space-based and surface-based observing components. The Conference also indicated that a GCOS should meet the needs for climate system monitoring, climate change detection and response monitoring, especially in terrestrial ecosystems; data for application to national economic development; and research towards improved understanding, modelling and prediction of the climate system.

7. The UNESCO Third Medium Term Plan (1990-1995), which the UNESCO General Conference adopted at its 25th Session, (November, 1989), includes a commitment to substantially accelerate existing ocean observing activities for research and operational uses.

8. Many millions of people living in low-lying coastal, deltaic and island environments are threatened by sea level rise and storm surges. Small island states are particularly vulnerable. The Malé Declaration on Global Warming and Sea-Level Rise, adopted at the Small States Conference on Sea-Level Rise held in Malé, Republic of Maldives, (14-18 November 1989), proposes the establishment of a climate and sea- level monitoring network.

III. Action taken

9. In response to these decisions, the Intergovernmental Oceanographic Commission has decided to pursue a major intergovernmental initiative to develop a Global Ocean-Observing System required for monitoring and predicting environmental changes to meet global, regional and national interests. This system, to be co-ordinated by IOC, will provide for regular observations of major physical, chemical and biological properties of the World Ocean, including the coastal zone and enclosed and semi-enclosed seas. It will address such issues as global climate predictions and sea- level rise, as well as the coastal marine environment problems of Member States. Initial implementation will use existing intergovernmental programmes and will be continually updated and improved with the addition of new elements in response to the results of ocean research programmes and development and transfer of new technology.

10. Established operational ocean observing systems can provide the basis for the development of a comprehensive, integrated system. This system needs to be improved and augmented by ocean remote sensing, an expanded sea-level network, wide use of automated observational systems and the incorporation of new technology. Development of systems for routine biological and chemical measurements is required. The international system for collection and exchange of data and data products should be further improved. Standards need to be established.

11. Substantial training, education and mutual assistance efforts must be undertaken to establish partnerships with developing countries. Training must be provided, and exchange of technology and products should be encouraged. The full implementation of GOOS will result in a significant increase in observing elements and therefore it should be recognized that a significant assistance programme is required.

12. Close and permanent interaction is required with the international scientific community, including the International Council of Scientific Unions. Specifically, large-scale research programmes such as the Study of Tropical Ocean and Global Atmosphere, the World Ocean Circulation Experiment and the Joint Global Ocean Flux Study will ensure the sound scientific basis for GOOS design and the application of GOOS data for analysis and prediction of the state of the marine environment.

13. Climate-related components of the Global Ocean Observing System will be developed jointly with the World Meteorological Organization as the ocean component of the Global Climate-Observing System; coastal and near-shore monitoring components related to climate change will be developed jointly with the United Nations Environment Programme and the World Meteorological Organization.

14. A Global Ocean-Observing System requires continuous and systematic data gathering, exchange, processing, and distribution of products, with the addition of operational funding and resources to the scientific base. Existing activities tend to be driven by research programmes rather than operational needs, and include a diverse array of platforms, agencies and programmes. Existing monitoring and data exchange systems have, however, substantial gaps in spatial and temporal coverage that would be needed to meet climate-scale and environmental monitoring needs.

IV. Conclusion

15. Therefore, the Member States of the Intergovernmental Oceanographic Commission recommend that the Conference adopt the following statement:

V. Declaration on a Global Ocean-Observing System

> Recognizing the key role of the oceans in determining the earth's climate, and recognizing the present evidence of anthropogenic environmental changes in the oceans, the Conference assigns a high priority to planning, implementing and maintaining a Global Ocean Observing System for the collection, analysis and distribution of data and information from the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and from coastal areas. This system should be based on the principle of free and open exchange of data and the resulting information and benefits. The Conference requests the Intergovernmental Oceanographic Commission to continue the development of this system, in cooperation with other international organizations. The Conference urges countries to support this system through their national facilities and services based on the principle that each country participate, according to its means, so that all countries may benefit.

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO
Member States of the Commission (117)
(as of 11 March 1991)

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URUGUAY
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VIETNAM
YUGOSLAVIA

In accordance with its Statutes the Intergovernmental Oceanographic Commission is a functionally autonomous body within the United Nations Educational, Scientific and Cultural Organization (UNESCO). The purpose of the Commission is to promote marine scientific investigations and related ocean services, with a view to learning more about the nature and resources of the oceans through the concerted actions of its Members. One function is to promote, plan and co-ordinate observing and monitoring systems on the properties and quality of the marine environment, as well as the preparation and dissemination of processed oceanographic data and information, and of assessment studies.

VI. DESCRIPTION OF EXISTING SYSTEMS

a. **World Weather Watch (WWW)** - the world-wide, co-ordinated, developing system of meteorological facilities and services provided by Members for the purpose of insuring that all Members obtain the meteorological information they reguire both for operational work and for research. The essential elements of the WWW are: The Global Observing System - the co-ordinated system of methods, techniques and facilities for making observation on a world-wide scale within the framework of the WWW, the Global Data Processin System - the co-ordinated global system of meteorological centres and arrangements for the processing, storage and retrieval of meteorological information within the framework of the WWW, and the Global Telecommunications System - the co-ordinated global system of telecomunications facilities and arragements for the rapid collection, exchange and distribution of observations and processed information within the framework of the WWW. Although WWW surface coverage is extensive, large voids exist over ocean areas, especially in the southern hemisphere. The WWW includes about 7000 ships recruited by 49 countries who participate in a Voluntary Observing Ships scheme to provide marine meteorological information. Polar-orbiting satellites are operated by four countries with plans underway for additional satellite series; geostationary satellites are also operated by four countries. Priority needs to be given to an assessment of present and foreseeable ocean remote sensing capabilities. Years of advance planning are needed to design sensor and platform configurations, and promising research systems need to be evaluated for potential use as operational systems.

b. **Integrated Global Ocean Services System (IGOSS)** - the international operational system for the global collection and exchange of oceanic data and the timely preparation and dissemination of oceanic products and services. IGOSS is planned, developed and co- ordinated jointly by the IOC and the WMO, and consists of national facilities and services provided by the participating Member States themselves, which share data for mutual benefit. The IGOSS structure is similar to that of the WWW, i.e., the IGOSS Observing System, the IGOSS Data Processing and Services System and the IGOSS Telecommunications Arrangements (chiefly based on the WWW GTS). About one-third of the established goals for 1989-1995 have been achieved. Substantial additional national commitments are needed to provide adequate coverage, particularly in the Indian and Southern Oceans - data-sparse areas.

c. **Global Sea Level Observing System (GLOSS)** - the IOC programme for the provision of standardized sea level data from a global network of stations. Presently about 200 of the 306 proposed stations are operational, with the support of 79 countries. Establishment and maintenance of stations in the Antarctic and Arctic, as well as in Africa and on remote islands, requires substantial effort.

d. **Drifting Buoy Activities** - managed by the IOC-WMO Drifting Buoy Co-operation Panel. The Panel was established to insure the optimum use of drifting buoy deployments and to maximize the amount of buoy data available to the relevant IOC and WMO programmes. Approximately 600 buoys are now operated by 11 countries, with 35 per cent transmitting data in via the GTS. That proportion is increasing.

e. **International Oceanographic Data and Information Exchange (IODE)** - the IOC programme for international exchange of ocean data through a network on national oceanographic data centres, designated national agencies, responsible national oceanographic data centres, and world centres. A total of 42 countries now have national data centres or designated national agencies. Established in 1960 to facilitate the exchange of oceanographic data and information among Member States of the IOC, the IODE system provides standard forms for coding and reporting data, encourages the preparation of data catalogues and assists in developing national oceanographic data centres. The system is based on the principle that national institutions, international programmes, and individual scientists contribute data voluntarily to the IODE data centres for the benefit of all. System users can then obtain free of charge or at a low price data, data products or data inventory information. A Marine Environmental Data and Information Referral System (MEDI) provides a multi-disciplinary source guide to the availability and creation of marine environmental data. The IODE Network includes: National Oceanographic Data Centres (NODCs) - NODCs provide the contact with the oceanographic programmes of a Member State. In addition to responsibilities for data collection, processing, quality control, archiving and dissemination nationally, NODCs are responsible for international exchange. Responsible National Oceanographic Data Centres (RNODCs) - RNODCs assist World Data Centres with particular requirements for data provision or retrieval or with a particular type of data or specific region. There are 12 RNODCs. World Data Centres for Oceanography (WDCs) - WDCs for Oceanography, established within the ICSU WDC system, are also recognized as IODE centres. These WDCs receive oceanographic data and inventories from NODCs, RNODCs, marine science organizations and individual scientists, freely exchange data, publications and inventories among one another, and provide, upon request, copies of data, inventories and publications. WDCs are located in Moscow, Washington and Tianjin, PRC. As of 1988 the WDCs held data for more than 2,250,000 observations, including data from 960,000 oceanographic stations, 505,000 bathythermographs, 135,000 biological observations and 660,000 current measurements.

f. **World Climate Programme** - promotes, under the auspices of WMO, internationally co-ordinated research and monitoring of climate variations or changes, including a Climate Change Detection Project initiated in 1989. It also promotes the use of climate information to assist economic and social planning and development.

g. **Global Environmental Monitoring System (GEMS)** - a UNEP programme to promote the coordination and collection of environmental data and as the heart of the United Nations system-wide "Earthwatch". Earthwatch, as defined by the 4th Session of the UNEP Governing Council, is a "dynamic process of integrated environmental assessments by which relevant environmental issues are identified and necessary data are gathered and evaluated to provide a basis of information and understanding for effective environmental management". The four main programme areas of GEMS are climate-related monitoring, monitoring of renewable resources, monitoring of environmental pollution, and collection of environmental data. A Georeferenced Information Databank (GRID) is a component of GEMS and is used for local and regional development and planning purposes.

h. **International Environmental Information System (INFOTERRA)** - a UNEP programme designed as a mechanism for nations to gain access to environmental information. It is a referral service for scientific and technological information.

i. **Global Investigation of Pollution in the Marine Environment (GIPME)** - IOC programme implemented in close co-operation with UNEP, IAEA, IMO and ICES. The Global Investigation of Pollution in the Marine Environment (GIPME) is conceptually bi-modal; there are the regional activities being implemented under the umbrella of Marine Pollution Monitoring System (MARPOLMON) and the really global elements such as the development of methodologies, intercalibration exercises to ensure inter-comparability of results from various laboratories and regions, etc.

The GIPME Action Plan is being executed through three specialized groups namely, the Group of Experts on Methods, Standards and Intercalibrations (GEMSI), the Group of Experts on Effects of Pollutants (GEEP) and the Group of Experts on Standards and Reference Materials (GESREM).

UNITED
NATIONS

A

General Assembly

Distr.
GENERAL

A/CONF.151/PC/71
17 July 1991

Original: ENGLISH

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August-4 September 1991
Working Group II
Item 2 of the provisional agenda

LAND-BASED SOURCES OF MARINE POLLUTION

Report of the Secretary-General of the Conference

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GE.91-61964/3511B

I. INTRODUCTION

1. The threat to the marine and coastal environment from the disposal of substances and wastes from land-based sources is today clearly recognized. There has been increasing interest on the part of the international community in developing effective control strategies, particularly for enclosed and semi-enclosed seas.

2. The Preparatory Committee at its first session, in its decision 1/20 (para. 5) requested the Secretary-General of the Conference to follow closely the work of the intergovernmental meeting of experts subsequently held in Halifax, Canada, 6-10 May 1991, in cooperation with UNEP, IOC/UNESCO, and the Office for Ocean Affairs and the Law of the Sea of the United Nations Secretariat, to develop general principles for the protection of the marine environment from land-based sources of pollution and, as appropriate, to report on the results of this meeting. The report is contained in part I of this document under the title: "Report of the Intergovernmental Meeting of Experts on Land Based Sources of Marine Pollution" held in Halifax, Canada 6-10 May 1991. Annexes to this report will be made available in the drafting language at the Preparatory meeting.

3. The Preparatory Committee in paragraphs 4 and 6 of decision 1/20, invited the United Nations Environment Programme, in cooperation with relevant organizations of the United Nations system "to consider making an evaluation of proposals for the further development of scientific, technical and financial cooperation for the protection of the marine environment from land-based sources of pollution" and "to consider undertaking an evaluation of the 1985 Montreal Guidelines for the Protection of the Marine Environment from Land-Based Sources of Pollution, where appropriate, taking into consideration existing regional agreements". These reports are contained in part II and part III of this document under the titles: "Further Development of International Cooperation for the Protection of the Marine Environment Against Land-Based Sources of Pollution" and "Action Taken to Implement or Respond to the Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-Based Sources".

II. REPORT OF THE INTERGOVERNMENTAL MEETING OF EXPERTS ON LAND-BASED SOURCES OF MARINE POLLUTION

Held in Halifax, Canada 6-10 May 1991

A. INTRODUCTION

1. The meeting was declared open on Monday, 6 May 1991 by the Chairman, John P. Bell (Canada), who welcomed the expert delegates to Halifax.

2. A speech was delivered to the plenary by the Honourable Pauline Browes, Canada's Minister of State for the Environment.

3. The Chairman then delivered his introductory remarks, in which he described the background to the Halifax Meeting, noting its origin as an initiative of the Canadian Prime Minister at the July 1990 G-7 Houston Summit and its subsequent endorsement by the First Preparatory Committee of the United Nations Conference on Environment and Development (UNCED). He summarized the meeting preparations of the Canadian Government which were carried out in consultation with relevant United Nations (UN) agencies.

4. The Chairman outlined the structure of the meeting and drew attention to the four categories of experts invited to attend: government representatives; invited speakers and chairpersons; invited international, governmental and non-governmental organizations; and observers. The anticipated output of the meeting was to be contained in a final report to be tabled at the Third Preparatory Committee (PrepCom) for UNCED in August 1991.

5. The Chairman proposed three goals/objectives for the Halifax Meeting: (1) to develop principles for protection of the marine environment from Land-based Sources of Marine Pollution (LBSMP); (2) to study the various scientific, social and legal elements to be addressed if there is to be a concerted global attack on the problem; and (3) to develop a recommended strategy and action plan for consideration by the Third Preparatory Committee of UNCED. He recommended that the Halifax Meeting work with the definitions found in the "Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-based Sources".

6. The Chairman introduced the four Working Groups and chairpersons:

- Health of the Marine Environment [Herb Windom (GESAMP)]
- Principles for Protecting the Marine Environment [Geoffrey Holland (Canada)]
- Prevention and Control Strategies and Actions [Ronny Ferm (Sweden)]
- Social, Economic and Legal Factors Relating to Land-based Sources of Marine Pollution (LBSMP) [George Papadatos (Greece)]

7. The Chairman proposed that the Meeting recommend any next steps, including the possibility of a global instrument. Recommendations would be presented not only at the Third PrepCom, but also at the preceding 16th UNEP Governing Council, the 1991 London G-7 Summit and the July Advisory Committee on Protection of the Sea (ACOPS) Conference.

8. The Chairman concluded that protection and conservation of oceans and their resources demands a comprehensive, sequential, and coordinated approach. The Halifax Meeting might consider the need for an UNCED 1992 resolution that would treat all oceans issues in such a comprehensive, integrated manner. He stressed that any global progress on LBSMP would require the gradual development of consensus.

9. Three papers were delivered to the plenary session: "Land-Based Sources of Marine Pollution and the State of the Marine Environment" by H.L. Windom; "A Comprehensive Approach to Land-Based Sources of Marine Pollution", by Peter S. Thacher; and "The Legal Regime of Land-Based Sources of Marine Pollution", an ACOPS paper delivered by Elizabeth Mann-Borghese.

10. The Meeting adopted the statement found in Section 2.0, and the Conclusions and Recommendations found in Section 3.0. In preparing the Statement, and Conclusions and Recommendations, the Meeting noted the usefulness of the reports prepared and accepted by the four Working Groups. The Meeting agreed to include the working group reports as annexes recognizing that plenary had insufficient time to review and approve them. The four working group reports are in Annexes 1 to 4.

11. A list of participants attending the Meeting is in Annex 5 and a list of discussion documents considered by the Meeting is found in Annex 6. The documents will be available under a separate cover.

B. STATEMENT OF THE INTERGOVERNMENTAL MEETING OF EXPERTS ON LAND-BASED SOURCES OF MARINE POLLUTION

12. The First Session of the United Nations Conference on Environment and Development (UNCED) Preparatory Committee, while considering the issue of ocean and seas, recognized that land-based sources of pollution is a priority area for action as it links development and the environment. For that purpose, it requested that general principles, proposals, and programmes covering scientific, technical and economic issues should be developed by the Intergovernmental Meeting of Experts on Land-Based Sources of Marine Pollution.

13. Human activities on land are recognized as the major contributor to the degradation of the marine environment. Contaminants reach the sea from rivers, from the atmosphere and from more direct inputs, particularly in the coastal zone. Clearly, all economic sectors are involved: agriculture, industry, fisheries, maritime activities, tourism and of course human settlement.

14. The situation can only expect to worsen, particularly as populations grow and concentrate in the coastal zone. The Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) warns in its 1990 report on the State of the Marine Environment that, if unchecked, the trend will lead to global deterioration in the quality and productivity of the marine environment.

15. There are clear signals as to the urgent need for action at all levels: global, regional, national and local. For example, as GESAMP has highlighted in the above report, outbreaks of infectious hepatitis and cholera are associated with the consumption of raw shellfish harvested from wastewater-polluted coastal areas. The increasing and indiscriminate use of pesticides and fertilizers, if unchecked, will lead to increased pollution of the ocean.

16. Existing local, national, regional and global efforts are clearly inadequate to halt and reverse current deterioration of the marine environment. Further action is needed at all levels.

17. It is now recognized that an anticipatory rather than a reactive approach is necessary to deal with marine pollution and the problems that flow from it. Clean production and the minimization of wastes is now seen as the way to proceed. The protection and conservation of oceans and their resources demands a comprehensive, sequential and coordinated approach involving all sectors and consideration of air, land and water interactions.

18. UNCED presents the opportunity to link the solutions to this problem with other agenda items such as hazardous wastes, air pollution, land and agriculture, fresh water, and cross-sectoral issues such as poverty, public health, human settlements and economics.

19. UNCED needs to recognize the urgent nature of this problem and ensure that the global community does not miss this opportunity to advance international action and confirm the principles necessary for establishing a global strategy for addressing land-based sources of marine pollution. In order to complete the actions anticipated by the UNCED Preparatory Committee on this issue, it is recommended that the Intergovernmental Meeting of Experts on Land-based Sources of Marine Pollution be reconvened preferably before the end of 1991. It would develop a declaration and the specific elements necessary for a strategy and action plan, drawing upon the findings of the Halifax meeting and relevant UNCED documents.

20. The Meeting of Experts will prepare the elements for action on the urgent problem, including:

(a) strengthening existing cooperative instruments and mechanisms, (including the Montreal Guidelines), taking into account the United Nations Conference on the Law of the Sea;

(b) development of new programmes and arrangements related to the major sources of pollutants of global significance, such as control of sewage, nutrients and synthetic organic compounds entering the marine environment;

(c) suggestions for assignment of institutional responsibilities for coordinating and catalytic functions; and

(d) application of processes and policies to avoid generating pollution in development activities.

21. The meeting also recommended that the results of this process be presented to the Fourth UNCED Preparatory Committee Meeting, incorporated in Agenda 21 and presented at UNCED in 1992 for adoption. Furthermore, the meeting recommended that Canada should be requested to continue as lead country in this process in cooperation with the UNCED Secretariat.

C. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

22. The global ocean must be considered as an entity when developing protection strategies and actions. The global ocean does not recognize State boundaries.

23. The ocean margins, which include the shelf and marginal seas, are suffering from a variety of adverse effects. If unchecked, this trend will lead to global deterioration in the quality and productivity of the marine environment.

24. Adverse effects include pollution by contaminants from sources transported by rivers and the atmosphere, physical alterations, habitat destruction and over-exploitation of resources.

25. Contaminant threats to the marine environment include: sewage, nutrients, synthetic organic compounds, sediment, litter, metals, radionuclides, oil/hydrocarbons, and polycyclic aromatic hydrocarbons (PAHs).

26. While there are obvious global priorities (e.g. sewage, nutrients, and synthetic organic compounds), there are both national and regional differences in terms of knowledge, viewpoints, infrastructure and technology that may give different emphases to these in specific circumstances.

27. Because of the importance of the ocean margins in providing marine resources and controlling biogeochemical cycles, the deterioration of these areas poses a major threat to sustainable use.

28. In developing management strategies, there is a continued need for scientific information. However, deficiencies in contemporary scientific understanding should not limit the initiation of management action.

29. Sustainable development has been defined as "a dynamic process designed to meet today's needs without compromising the ability of future generations to meet their own needs. It requires societies to meet human needs by increasing productive potential and by ensuring equitable, social, and political opportunities for all."

30. The concept of sustainable development incorporates the notion of stewardship and responsibility to future generations. It calls on industrialized nations both to control their own impacts and to encourage and assist developing nations in acquiring and incorporating newer, environmentally sound technology and sustainable practices.

31. Sustainable resource management should be seen as a tool in meeting the problems of poverty and development.

32. Developing countries are faced with the ultimate dilemma of ensuring sustainability of their environment while using development to achieve minimum living standards.

Recommendations

33. All States acting individually and in cooperation with relevant international organizations should develop rational uses of natural resources which are sustainable, and preserve the ecological integrity of significant components of the biosphere irrespective of their utility to man.

34. States should adopt, individually or jointly, and in accordance with their capabilities, precautionary measures necessary to prevent, reduce and control pollution from land-based sources, including those designed to minimize to the fullest possible extent the release into the marine environment of toxic, harmful or noxious substances, especially those which are persistent.

35. Environmental considerations should be part of planning and management processes.

36. An essential element of assistance is establishing and upgrading national and local capacities in monitoring, assessment, planning, management and research.

37. At the regional level, capacity building may include establishing suitable frameworks (agreements, conventions, etc.) for regional cooperation and technical and secretarial capacity for developing harmonized action programmes.

38. Reduction and control of point-source pollution should be done at the source rather than at the point of environmental release. The application of "best available technology" is often an effective means of meeting environmental goals, especially for retrofitting existing facilities. For new investments, best available technology should be chosen because of decreased energy consumption, best use of raw materials, and minimizing of waste and polluting emissions into air and water.

39. "Clean technology" (i.e. environmentally sound practices) together with economic incentives are more applicable and must be encouraged. Ultimately, a combination of clean technology and pollution reduction at the source should be pursued.

40. In many instances, there is a preferred need for developing suitable or adapting existing indigenous or labor-intensive processes rather than importing highly capital-intensive technologies seen in developed countries.

41. Reduction and control of non-point source pollutants requires broad changes in sewage and waste management, shifts in agriculture practices, and environmentally compatible approaches to mining, construction and transportation practices.

42. The role of non-governmental organizations (NGOs) is important in bringing issues to the attention of the public and government at all levels, and they are an important source of information and expertise. Their participation and involvement should be encouraged.

43. Efforts at national levels will not succeed without local commitment, management responsibility and public willingness.

44. Management and control of land-based pollutants requires a parallel and independent scientific thrust, preferably within the local and national situations.

45. A coherent strategy, whether on a national, regional or global scale, is necessary to tackle land-based sources of pollution.

46. Such a strategy must: (1) be based on a commonly accepted set of principles, (2) contain a set of goals to be achieved and (3) prescribe the essential elements of environmental management at the national level.

47. Regional or subregional cooperation is frequently the crucial component for resolving land-based marine environmental problems and should be encouraged.

48. It is necessary to adapt and improve traditional economic approaches. New concepts and operational tools should be developed.

49. The use of economic instruments can, in many cases, be more efficient and effective as well as assist regulatory measures in achieving objectives.

50. Adequate financial resources for developing countries should be allocated to preventing and solving problems associated with land-based sources of marine pollution. Included in this:

(a) technology transfer costs should not add to their debt burden,

(b) debt/nature swaps and possible development of revolving funds for selected LBSMP should be further explored, and

(c) development funds should take into serious consideration LBSMP objectives.

51. Priority should be given to integrated coastal and marine planning and management, particularly in view of the projected population increase in coastal zones.

52. Greater efforts need to be made in education, training, public awareness, information dissemination and institution building.

53. Substantial improvements are needed in the existing legal and institutional framework concerning land-based sources of marine pollution at global and regional levels.

54. Regardless of the form that an international mechanism is given, the following are among the basic requirements for effective action:

(a) build upon the principles of the Montreal Guidelines;

(b) assign responsibility for coordinating and catalytic functions;

(c) strengthen regional mechanisms and encourage States to enter into regional agreements;

(d) provide for the exchange of information and the transfer of technologies and other resources;

(e) provide for more effective data-collection and monitoring; and

(f) develop timetables for implementation of selected options.

55. While there are gaps to be filled, major parts of the necessary national and regional structures for addressing LBSMP are in place; however control efforts must be given a much higher priority and a major increase in resources to cope with the scale of the problems.

III. FURTHER DEVELOPMENT OF INTERNATIONAL COOPERATION FOR THE PROTECTION OF THE MARINE ENVIRONMENT AGAINST LAND-BASED SOURCES OF POLLUTION

Report by UNEP

A. BACKGROUND

1. There has been increasing concern on the part of Governments, and the international community as a whole, with the problem of land-based sources of marine pollution which constitutes by far the most serious threat to the oceans today. This concern is also evident from inquiries and approaches which continue to be made by intergovernmental and non-governmental international organizations all over the world. All these organizations, and many Governments, have noted with increasing unease the serious and adverse impact of land-based sources of pollution on coastal areas and, particularly, on enclosed and semi-enclosed seas. This impact has been documented in startling detail in the 1990 GESAMP report on the State of the Marine Environment.

2. The review of the action taken in response to the Montreal Guidelines shows that the Guidelines have received a very positive reaction from many Governments and international organizations. In many cases the Guidelines have formed the basis or inspiration for national legislation, regional cooperative arrangements as well as important initiatives in international organizations within and outside the United Nations system.

3. There have been a number of recent proposals for further international action to control land-based sources of marine pollution, mostly calling in general terms for some type of international convention on the subject. UNEP therefore gave in-depth consideration to the problems associated with the development and implementation of a global instrument or other appropriate arrangement which can promote and facilitate effective scientific, technical and financial cooperation to prevent, reduce and control pollution of the marine environment arising from sources and activities within the land territories of States. This consideration involved detail examination of the various proposals concerning the nature and form of a possible instrument or arrangement, taking into account the instruments and mechanisms which already exist at both the regional and global levels.

B. INTERNATIONAL COOPERATION FOR THE PROTECTION AND PRESERVATION OF THE MARINE ENVIRONMENT

4. The United Nations Convention on the Law of the Sea, 1982 (UNCLOS 1982) provides that States shall:

(a) Individually or jointly, as appropriate, take all measures necessary to prevent, reduce and control pollution of the marine environment from any source (Art. 194, para. 1);

(b) Cooperate on a global basis and, as appropriate, on a regional basis ... in formulating and elaborating international rules, standards and recommended practices and procedures ... for the protection and preservation of the marine environment, taking into account characteristic regional features (Art. 197);

(c) Cooperate directly or through a regional organization to coordinate their management, use, protection and research on enclosed and semi-enclosed seas (Art. 123);

(d) Promote directly or through competent international organizations programmes of scientific, educational, technical and other assistance to developing countries for the protection and preservation of the marine environment and the prevention, reduction and control of marine pollution (Art. 202).

5. With respect to international and national rules for the prevention, reduction and control of marine pollution from land-based sources, UNCLOS 1982 provides in Articles 207 and 213 that:

(a) States shall adopt laws and regulations to prevent, reduce and control marine pollution from land-based sources;

(b) States shall endeavour to harmonize their policies at the appropriate regional levels;

(c) States shall, in adopting laws and regulations on the subject, take into account international agreed rules, standards, recommended practices and procedures;

(d) International rules, standards, recommended practices and procedures are to be established by States acting especially through competent international organizations or diplomatic conference. These rules, standards etc. are to be reviewed from time to time, as necessary.

(e) States "shall enforce their laws and regulations adopted in accordance with Article 207 and shall adopt laws and regulations and take other measures necessary to implement applicable international rules and standards established through competent international organizations or diplomatic conferences ..." (Art. 213).

6. These provisions of UNCLOS 1982 are based on certain generally accepted assumptions and premises, namely:

(a) that any meaningful programme for protecting the marine environment from land-based sources of pollution must begin with , and be based primarily on, action at the national level;

(b) that effective protection of the marine environment from land-based sources requires in many cases a measure of inter-State cooperation, mainly at the regional level;

(c) that a comprehensive programme for the protection and preservation of the marine environment from land-based sources must have an international component; particularly with regard to the development, review and updating of the global and regional rules, standards, procedures and practices on which national and regional measures should be based.

7. These assumptions and premises have also been the basis of the initiatives which have been taken in UNEP on the subject. The two major initiatives in this regard have been:

(i) the Regional Seas Programmes and their related Conventions and Protocols, and

(ii) the Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-based Sources.

The same assumptions and premises have also inspired and underpinned other agreements and arrangements which have been concluded in other forums both within and outside the United Nations system.

The Regional Seas Conventions

8. The UNEP Regional Seas Programme, covering 10 regional sea areas, are tailored to the particular needs of the participating States. However, almost all have the same basic components, namely, an Action Plan supplemented by a legally-binding treaty instrument. The Action Plan is intended to promote practical cooperation in such areas as research, monitoring, combating of pollution emergencies and the development of coastal marine resources. The treaty instrument usually comprises provisions outlining the mutual commitment of the Parties to take "appropriate measures" in respect of specific areas. One of the major areas specifically mentioned under all the regional conventions is the protection and preservation of the marine environment from land-based sources of pollution.

9. All the regional conventions contain general provisions announcing the undertaking of their Parties to "endeavour ... to adopt measures ... to prevent, reduce (abate) and control (combat) pollution of the marine environment and coastal area" inter alia, from land-based sources. In addition the Mediterranean Sea Convention, the South-East Pacific Coastal Area Convention and the Kuwait Regional Convention have special protocols dealing with protection against pollution from land-based sources adopted in 1980, 1983 and 1990 respectively, and others are under consideration. These protocols contain annexes listing polluting substances to be eliminated or strictly limited, and provide for regular consideration of abatement measures.

10. Because of the economic implications and complex technical nature of controls and abatement measures for specific pollutants, progress in implementing these protocols has tended to be slow. Some measures have been adopted under the protocol for the Mediterranean, but none as yet in the South-East Pacific.

11. While the adoption and implementation of regional legal measures for land-based sources of pollution has been relatively slow in the Regional Seas, most of the regions have actively pursued surveys and assessments of land-based sources of pollution and monitoring of the resultant pollutant levels in the marine environment. Where such studies indicate significant levels of pollution, it is expected that they will lead to some pollution control measures under the general obligations of the conventions and action plans even in the absence of a specific protocol.

The 1985 Montreal Guidelines

12. The Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-based Sources were developed as part of the follow-up to the Montevideo Programme for the Development and Periodic Review of Environmental Law which was adopted by the Governing Council of UNEP on the recommendation of the Ad Hoc Meeting of Senior Government Officials Experts in Environmental Law, 1981. The Guidelines, which were formally adopted in Montreal, Canada on 19 April 1985, were noted by the Governing Council of UNEP at its thirteenth session in 1985. At that session the Governing Council encouraged States and international organizations "to take the Guidelines into account in the process of developing bilateral, regional and as appropriate global agreements in this field". The Executive Director of UNEP was requested by the Governing Council to "distribute the Guidelines to all States and international organizations concerned".

13. The Montreal Guidelines were elaborated on the basis of certain common elements and principles which had already been accepted and incorporated into a number of existing international agreements on the protection and preservation of the marine environment. They were addressed to Governments "with a view to assisting them in the process of developing appropriate bilateral, regional and multilateral agreements and national legislation". The Guidelines are presented as a "check-list of basic provisions which Governments may select from, adapt or agree upon, as appropriate, to meet the needs of specific regions". The Guidelines consist of 19 sections, the first three of which deal with definitions, basic obligations and a general provision on the duty to prevent "pollution to the marine environment of other States of or areas beyond the limits of national jurisdiction". The remaining sections deal with specific substantive issues including in particular:

Section 4 Adoption of measures against pollution from land-based sources;

Section 5 Cooperation on a global, regional or bilateral basis;

Section 6 Specially protected areas;

Section 7 Scientific and technical cooperation;

Section 8 Assistance to developing countries;

Section 9 Developing of a comprehensive environmental management approach;

Section 10 Monitoring and data management;

Section 11 Environmental assessment;

Section 13 Development of control strategies;

Section 15 Notification, information exchange and consultation;

Section 16 National Laws and Procedures;

Section 17 Liability and compensation for pollution damage;

Section 18 Implementation reports; and

Section 19 Institutional Arrangements.

In addition the Guidelines have three Annexes dealing, respectively, with:

Annex I Strategies for Protecting, Preserving and Enhancing the quality of the Marine Environment;

Annex II Classification of Substances; and

Annex III Monitoring and Data Management.

14. Although the Montreal Guidelines are presented in the form of "general statements" of obligations and requirements, they are not intended to have the force of law or to impose legal obligations on any State. Rather, they are stated to be of "a recommendatory nature" and they are "without prejudice to the elaboration of cross-sectored guidelines, at a later stage".

Other Initiatives (global and regional)

15. As indicated earlier, the Montreal Guidelines were prepared on the basis of common elements and principles drawn from relevant existing agreements dealing with the protection and preservation of the marine environment from pollution in general, and from land-based sources in particular. Apart from the provisions of the 1982 United Nations Convention on the Law of the Sea (Part XII) the other agreements which were drawn upon included the 1974 Paris Convention for the Prevention of Marine Pollution from Land-based Sources, the 1974 Helsinki Convention for the Protection of the Marine Environment of the Baltic Sea Area and the 1980 Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based sources.

16. Other international agreements whose provisions or purposes are relevant to the prevention of pollution from land-based sources include the 1974 Nordic Convention for the Protection of the Environment, the 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft and the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (the London Dumping Convention).

17. Also worth mentioning are several (mainly bilateral) agreements relating to the protection of certain specific subregional sea-areas, most of which are enclosed or semi-enclosed seas. Among these are the 1974 Denmark-Sweden Agreement Concerning the Protection of the Sound; the 1972 Italy-Yugoslavia Agreement on Cooperation for the Protection of the waters of the Adriatic) the 1976 Agreement on the Protection of the Mediterranean Coastal Waters (between France, Italy and Monaco); the 1979 Italy-Greece Agreement of Cooperation on the Protection of the Marine Environment of the Ionian Sea and Coastal Zones; and the 1983 United States-Mexico Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area.

18. Like the UNEP Regional Conventions and the Montreal Guidelines, these other agreements approach the problem of land-based pollution prevention from more or less the same perspective and they rely on similar basic mechanisms for the achievement of their objectives. In particular the conventions and agreements:

(a) affirm the obligation of States to protect the marine environment and, in particular, their duty to ensure that, in exercising their sovereign rights within their territories, they do not cause pollution to the environment of other States or to areas outside national jurisdiction;

(b) declare the undertaking by the States Parties, individually and collectively to take effective legal, administrative and other relevant measures to prevent, reduce and control pollution of the marine environment from sources emanating from their territories;

(c) assert the commitments of States Parties to harmonize their policies and to cooperate in developing specific programmes, goals, criteria and measures concerning the prevention of such pollution, including joint programmes for scientific and technical research, monitoring and the exchange of information.

(d) state the agreement of the Parties that certain substances (listed or described in the treaty or in annexes thereto) shall not be permitted to enter the marine environment, either absolutely or only upon prior authorization in accordance with pre-determined procedures and by reference to specified criteria. In some cases the conventions or agreements also establish an institutional machinery (commission) to which are entrusted certain functions and powers in connection with the implementation and further development of the regime of the convention. In general the functions of the commission include:

(i) research to determine the nature, importance and source of pollutants and make the results of such research available to Parties:

(ii) making proposals to the Parties on common standards and procedures for implementing the convention:

(iii) review of the convention or the criteria and standards contained in the annexes thereto, with a view to recommending to the Parties such modifications or amendments as may be found to be necessary or desirable.

Deficiencies in the Current Position

19. While these bilateral and regional conventions and agreements, and indeed the Montreal Guidelines, represent an important and useful step toward the development of the necessary international cooperation for dealing with the problem of land-based sources of marine pollution, there is widespread unease and concern about the fact that, apart from the basic principles and a general framework laid down by UNCLOS, there is as yet no international agreement or arrangement which either has the needed global coverage or offers a sufficiently effective mechanism to be considered as a credible base for national and international action in this important area of environmental protection.

20. There are many reasons for this concern. In the first place it is a fact that pollution from land and land-based activities is by far the greatest single form of marine pollution, and thus constitutes the most serious environmental threat as far as the marine environment is concerned. Accordingly, the absence of an effective regime to deal with this threat on a coordinated global scale exposes a major weakness in the international strategy for protecting and preserving the seas and oceans of the world. In the second place most of the agreements consist only of general principles and undertakings by States to take (or endeavour to take) measures within their territorial jurisdictions. While a few of the conventions are supplemented by common regulations and standards for implementation, few of them have the necessary institutional mechanisms or arrangements for really effective implementation measures to facilitate or monitor action at the States level. Finally, and even more important, there is at present no global machinery for the development, review and updating of the international regulations, standards and rules which, according to the 1982 Convention on the Law of the Sea, States should "take into account" in formulating their national regulations and laws. In particular, there is no formal institutional link between the various regional and subregional rules at the global level and there is no worldwide arrangement or mechanism for harmonizing the regional and national efforts.

21. This absence of a "global link" is not the result of a deliberate policy on the part of States. Indeed, some of the regional conventions acknowledge the usefulness of, and the need for, international or global principles and arrangements. For example, the 1974 Convention on the Protection of the Marine Environment of the Baltic Sea Area states, in its Preamble, that the Parties recognize that "the protection and enhancement of the marine environment ... cannot effectively be accomplished by national efforts alone but that also close regional cooperation and OTHER APPROPRIATE INTERNATIONAL MEASURES aiming at fulfilling these tasks are urgently needed." Similarly the Parties to the Paris Convention for the Prevention of Marine Pollution from land-based Sources accept in the preamble, that "concerted action at the national, regional and global levels is essential to prevent and combat marine pollution". Moreover the Montreal Guidelines, although suggested as a broad framework for the development of similar arrangements in those regions where such agreements are called for were intended "to serve also as a framework for the preparation in the long term, should the need arise, of a global convention on pollution from land-based sources designed to strengthen international institutional arrangements to ensure the harmonization and application of global and regional rules, criteria, standards and recommended practices and procedures and to review the effectiveness of measures taken."

22. There is thus support for the view that some form of global instrument or other appropriate arrangement had originally been foreseen as a useful, even necessary, component of any effective cooperative effort to protect the marine environment from land-based sources of pollution. Recent discussions, within and outside the United Nations system, have revealed a general dissatisfaction with the fact that the existing regional (and global) instruments have not been linked in a cohesive and integrated manner which would enable the various related issues to be tackled effectively.

23. However, while there is general acceptance that there should be some form of "global dimension" to the prevention and control of marine pollution from land-based sources, there does not appear to be such a consensus with regard to the nature, form or scope of the arrangement that is necessary or feasible to achieve that objective. The difficulty in reaching an agreement on this point is in part compounded by the existence of so many international schemes on the subject which adopt different approaches and instrumentalities for achieving the same basic objectives. There is, of course, an understandable explanation for this state of affairs. Pollution from land-based sources arises almost entirely from activities and processes within and under the "territorial sovereignty" of the relevant coastal State or States. In addition the effects of this pollution become manifest, at least initially, in coastal zones which are mainly within the jurisdiction of one coastal State or only a few such States. Accordingly, this particular source of pollution and any procedures for its prevention and control tend invariably to touch upon important and often sensitive political economic and social interests of the coastal State. Hence they impinge on the powers and competences of the Governments concerned in such crucial areas as habitat regulation, the development of industrial and social infrastructures and the promotion of tourism and recreational facilities.

24. Moreover problems posed by land-based sources of pollution are not necessarily the same in all regions, and approaches and solutions which may be appropriate or effective in one region may not be necessary or even feasible in another region; either because the physical dimensions of the problem vary considerably or the prevailing physical or political conditions demand or will only permit entirely different mechanisms. For these and other reasons, the global approaches to the prevention and control of land-based sources of marine pollution have hitherto been largely hesitant and tentative, with greater scope allowed to national regulation and regional coordination and less emphasis placed on concrete global action or direction.

25. However, the continued deterioration of the marine environment and above all, the increasingly clear evidence that land-based sources of pollution pose the major threat to the oceans, have led to a very significant change in the attitude of many States and international organizations. There is now a widely accepted view that effective control of land-based sources of marine pollution is critical to any plans to protect the seas and oceans and, ultimately, the human environment as a whole. This has led to calls for concrete and urgent action to be taken to re-examine the situation in order to establish a reasonable balance between the sovereign prerogatives of coastal states, the legitimate needs and requirements of specific regions and the imperative requirements of international responsibility for the health and integrity of the marine environment and the prevention and control of pollution which, in the long run, will not respect national frontiers or the boundaries of State jurisdiction.

26. These calls for action do, however, recognize the existence of the various regional and global agreements and schemes and the fact that many of these are already in operation, even if they are not all as effective as may be desired. Accordingly it is not proposed to abolish or abrogate these existing agreements and instruments; rather the suggestions have been that consideration be given to the evolution of "a purposeful link" between the national and regional rules and standards in order to ensure that they are responsible both to national and regional circumstances and basic global requirements. In general the new mechanisms being advocated would involve:

(a) general principles for global application which would inspire, motivate and guide national and regional measures for effective protection of the marine environment against pollution from land-based sources;

(b) global mechanisms, including institutional machineries, for the development and implementation of scientific, legal, economic and social measures, at state and international levels, for the management of land-based activities and processes in order to prevent, reduce and control the pollution of the seas from such activities.

27. Any such comprehensive arrangements should meet a number of requirements if it is to be accepted as a meaningful answer to the problem. These requirements are that:

(a) the instrument or arrangements should address the many different aspects of the problem of land-based sources of pollution and be suitable for dealing with its different but inter-connected ramifications. To do this it must take account of the diversity in the nature of pollutants originating from land, and the different types of actions and measures for dealing with the various pollutants and the ways through which they enter the marine environment, including "point" and "non-point" discharges, river outflows, seepage through land and drainage courses, coastal disposal of domestic and industrial wastes and inputs from and through the atmosphere as a result of discharges, evaporation, condensation and precipitation. Each of these may require somewhat different approaches, with some being more obviously transboundary than others. The application of integrated coastal zone management is one way to deal in a more comprehensive fashion with the complexity of land-based sources.

(b) a global instrument or arrangement should be such that it will be accepted by a significantly large number of States as being reasonable, necessary and feasible. To fulfil these conditions it must be sufficiently cognizant of the legitimate interests, concerns and circumstances of different States and regions while also being responsive to the essential requirements of effective protection of the global environment as a whole. In particular, the instrument must allow maximum scope for national action with the highest possible measure of coordination at the regional level, both based firmly on clear and internationally developed principles, standards and criteria which can ensure a reasonable degree of uniformity in implementation and application in all States in every region.

(c) any such instrument or arrangement must have a realistic prospect of coming into operation with the minimum of delay and applying between the largest possible number of States. This means that its provisions and requirements should not be beyond the ability of any group of States, and the commitments it requires of States should not involve too many complicated constitutional processes or provoke controversies regarding the nature and scope of the burdens they entail for individual States.

Suggested Approaches

28. There are a number of possible approaches to further scientific, technical and financial cooperation on dealing with land-based sources of marine pollution. Clearly the present arrangements relying largely on action at the national level have been inadequate, as the problem has continued to worsen in most parts of the world.

29. The regional approach as exemplified by the Paris Convention for the North-East Atlantic and the Barcelona Convention and its protocol for the Mediterranean has certainly made some progress. Strengthening action in those regions that have some kind of regional programme, and creating regional programmes in areas where one does not exist, would allow the extension of the regional approach to all areas that need it. Each region could adopt its own standards and approaches suited to the body of water concerned and the nature of the priority pollution problems. While it is obvious that existing regional arrangements should be used and reinforced whenever they exist, most recent proposals suggest that the regional approach by itself is not sufficient, and that only some kind of coordinated action at the global level can achieve the measures necessary to solve this serious and complex problem. Some regions are less well equipped than others to undertake the research necessary to establish standards and procedures. Differences between regions could also lead to polluting industries moving to regions with more lenient standards.

30. At the global level, there are already some organizations addressing the problem of land-based sources as part of their mandates to deal with marine pollution. One or more of those organizations could be given an increased legislative mandate and resources to organize a concerted effort to assist states to control their land-based sources of pollution. Machinery could be created or reinforced to establish standards and procedures for measurement and monitoring, and to assist in spreading pollution control technologies. The 1985 Montreal Guidelines could be further developed into some kind of a non-binding international agreement. Such measures could be taken on an ad hoc basis, or they could be developed within the framework of some kind of a global instrument or arrangement for dealing with the problem posed by land-based sources of marine pollution in all its different aspects.

31. There have been some proposals for a comprehensive instrument for the protection of the marine environment against pollution from all sources as a kind of framework within which the total pollutant load entering the oceans could be managed. However, the development of such a convention would almost certainly re-open some of the complex issues which have been resolved, in some cases after protracted and delicate negotiations, in the existing conventions and other treaty instruments such as the 1982 Convention on the Law of the Sea,

the 1973/78 MARPOL Convention (prevention of pollution from ships), the 1972 London Dumping Convention (prevention of pollution by the dumping of wastes and other matter) as well as the regional conventions and protocols. If this were to happen, the negotiation process would be protracted and the new instrument might either fail to command wide acceptance or would only come into operation after a long delay.

32. A more practical alternative foresees the development of a global instrument for the prevention of marine pollution by only land-based sources, that is to say, by pollution of the marine environment which arises from or in connection with activities, processes and incidents which take place on land. Such an instrument would cover all pollutants which originate from land, regardless of the pathways by which the pollutants enter the sea, whether by discharges, disposal, seepage, drainage or through the atmosphere.

33. The main advantage of such an approach is that it would enable the international community to build on the existing framework, consisting of general principles and regional schemes, by filling in any gaps which now exist and providing the necessary link between the regional arrangement in order to obtain the "global dimension". This would help to complete the "three-pronged" strategy which is envisaged in Article 207 of the 1982 Convention on the Law of th Sea, viz. national laws and regulations and regional cooperative arrangements based on international regulations, standards etc. developed in and through a global machinery. Such an instrument would be able to draw on the many principles and procedures embodied in existing instruments, both global and regional, and the experience gained in their implementation in different States and regions. While the effectiveness of the existing arrangement may not be particularly impressive overall, it is also true that the record of achievement of some instruments and in some States has been sufficiently positive to serve as models on which to develop improved arrangements and schemes for national, regional or global application.

34. However a global instrument which deals only with pollution from land-based sources could have some disadvantages, especially if such an instrument were to be developed on the basis of the approaches which have hitherto been adopted in most of the existing conventions on the subject. Some of these approaches have been considered to be inadequate or ineffective for a number of reasons.

35. The main criticism is that the existing conventions, including the 1982 Convention on The Law of the Sea and some of the regional conventions, consist essentially of general statements on the rights and duties of States in areas within national jurisdiction, together with generalized undertakings by States to take (or endeavour to take) the measures needed to prevent or reduce pollution arising from activities within their jurisdictions. Where they go beyond such generalized commitments the conventions merely specify the categories of substances which should not be allowed to enter the marine environment or set out the conditions and limits for discharges of particular substances or categories.

36. It has been suggested that such an approach, based on "end-of-pipe" or "point of discharge" controls, has several crucial drawbacks. This type of control depends essentially on the availability of information about particular substances and their effects on the marine environment - either by themselves or in conjunction with other substances. In most cases, such information would be available only after the adverse effects have materialized to the point where they are sufficiently measurable or demonstratable. This is especially true of new substances, or combinations of substances, which may be developed or come into common use after the lists and limits in the conventions have been established.

37. The view has been expressed that this system of control may not always be appropriate, given the diversity in nature of pollutants which originate from land and the variety of the points from which, and the pathways through which, they reach the marine environment. This diversity in substance and mode of entry means that the action and measures appropriate or required will vary depending, for example, on the types of pollutants, their location and the modes of their discharge and the kinds of activities which produce or give rise to the pollutants. Thus the same measures and standards may not be suitable or effective in respect of point and non-point sources, river outflows, seepage through land and precipitation through the atmosphere. For example methods of control and regulation which may be necessary in relation to sources of pollution originating from large cities and other urban habitats (such as human and industrial wastes which can be treated before disposal) would not necessarily be appropriate in respect of agricultural wastes, by-products and effluents which enter the seas through seepage wastes, or through river catchment and drainage systems or pollutants which enter the marine environment through the atmosphere as a result of activities and processes on land, some of which may occur at great distances from the coastal zone. While regulations and procedures which utilize prohibitions or limits of discharges might work to some extent in dealing with pollutants which are discharged or disposed of in discreet quantities and at identifiable points, such procedures would be largely ineffective in relation to other pollutants which are released at random.

38. Moreover a system based on uniform lists of substances, limits of discharge or common standards and procedures for control is unlikely to be appropriate since such uniform standards and limits are not capable of being applied "across the board" in all States and in every region. This is because the circumstances and conditions of States and regions differ, and the capabilities of States vary considerably. Consequently, limits which can easily or conveniently be applied in one region may be considered to be unduly onerous or even unrealistic in other regions; and procedures and standards which may present few difficulties in one State may be completely outside the scope of another State. For this reason, the attempt to establish global standards and limits to be applied by all States and in all regions would engender conflict between those who demand (and can cope with) stringent requirements and those who may find the stringent requirements to be unduly inhibiting. This could result in the issues being considered as a choice between the demands of the environment on the one hand and economic and social development on the other. Such a characterization of the issues would not only be incorrect but it would also undermine the consensus on which alone true and effective international cooperation can be built.

39. But valid as they may be, these objections are not so much against the idea of global principles and standards as against the approaches which have hitherto been used or suggested. Indeed the calls for a global instrument have been based on the recognition that the existing regional schemes are not effective because of the absence of sufficiently clear global standards and principles. In any case the existing global instruments, including the Law of the Sea Convention and the Montreal Guidelines, expressly recognize the importance of flexibility and the need to take due account of the circumstances and capabilities of individual States and particular regions. And the UNEP Regional Seas Conventions and their related Protocols have all been developed on the basis that effective prevention of land-based sources of pollution must involve national measures which are coordinated or harmonized at the regional level. These are, however, expected to be based on international standards and criteria developed at the global level and adopted by UNEP for use in all the Regional Seas Programmes.

40. Consequently what is needed at the global level is a system which builds on the existing schemes by avoiding the deficiencies which have been identified therein, and filling the gaps which need to be filled. For this purpose the international community may wish to consider the development and adoption of a global instrument to deal with the control of "all forms of land-based sources of pollution". Such an instrument might promulgate general principles and general standards and procedures for implementing the principles at State and regional levels. It would also make provision for an institutional machinery for facilitating and encouraging the measures required for the effective implementation of the principles and standards by all concerned.

41. Such an instrument should preferably be multi-faceted and consist of a number of separate but closely-integrated components including, in particular:

(a) General principles on the rights, responsibilities and duties of States (in the case of a convention) and of international bodies, corporate persons and individuals in relation to the prevention, reduction and control of marine pollution from all activities, processes and occurrences which take place on land. These principles might preferably be a synthesis of those already embodied in existing conventions (global and regional), with such reformulations and refinements as may be considered necessary to make them more precise and more specific wherever possible.

(b) An enumeration and description of the various sources of pollution by reference to the activities or processes which give rise to pollutants and the different pathways through which pollutants enter or are introduced into the marine environment.

42. In line with the approach adopted in the existing regional conventions, a new instrument would need to have a suitable institutional machinery to facilitate, encourage or assist the practical implementation of the principles and standards incorporation therein. However, such an institutional machinery would have to be more elaborate in its structure and more comprehensive and specific in its mandate and authority. In particular the institutional machinery might comprise:

(a) a high-level intergovernmental body to provide political, legal and administrative direction and coordination for the various measures which would be needed to implement and apply the principles and standards of the instrument of all levels;

(b) a technical body or bodies of experts, and related institutions and facilities for the development, review and updating of standards, criteria and processes required for the practical implementation and enforcement of the principles and regulations specified in or under the instrument, including suitable arrangements and mechanisms for the provision of technical information, advice and assistance to governments, corporate bodies and individuals engaged in activities which could result in pollution of the sea; and

(c) a well-grounded institutional agreement for the procurement, management and disbursement of financial and other resources to assist States and other relevant entities to take the measures needed to achieve the objectives of the instrument.

C. FORM OF INSTRUMENT

43. With regard to the form of the proposed global instrument, two possible alternative possibilities may be envisaged. The first is a legally-binding treaty instrument (convention, agreement, protocol) which States will need to ratify, accept or accede to and which would impose binding obligations on all States which agree to be bound. The second alternative is a formal instrument which States may agree to operate without necessarily assuming additional legal obligations to other participating States.

Merits of a Legally-binding Convention

44. A legally-binding treaty would have certain advantages. First, such an instrument would impose the same obligations on all the States which agree to become parties. This would make it impossible for States to "pick and choose" from the provisions and obligations. Secondly a legally-binding instrument would give a measure of assurance to the States parties that, in taking the measure required under the instrument, they would not be putting themselves at an economic disadvantage vis-à-vis the other parties. Finally a legally-binding treaty would be more likely to have a supervisory mechanism with sufficient authority and competence to monitor implementation by all parties and thus serve to discourage States from attempting to shirk their responsibilities or disregard their commitments.

Disadvantages of a treaty instrument

45. But there are also some factors which detract from the attractiveness of a legally-binding treaty. Perhaps the most serious of these is the fact that a legally-binding treaty would take a long time to negotiate and adopt, and an even longer time to bring into force and applied between a sufficiently large number of States. Moreover, while a treaty would make it impossible for States to pick and choose from its provisions, it is also a fact that a treaty would only bind and impose obligations on those States which agree, in their sovereign discretion to be bound. Thus States would have the option to decide

whether or not to accept the treaty. Furthermore, it is doubtful that a new global treaty would in fact adopt entirely new principles or impose on State parties obligations which would be significantly more stringent than those already embodied in the existing international agreements. For one thing, a convention which incorporates radically different principles would generate more controversy and could, consequently, require a longer period to negotiate and adopt. For another, a treaty which places heavy obligations on States in respect of activities within national jurisdictions would most probably be unacceptable to many States and might, therefore, not stand a realistic chance of coming into force as early as might be required.

Possibility of a Non-Treaty Instrument

46. For these reasons, it may be worthwhile for the international community to give consideration to the preparation of less formal legal instrument which would not have the binding force of a treaty but which would, nevertheless, establish a new and more effective machinery for mobilizing international cooperation, at the regional and global levels, to give effect to the general principles which even now appear to be widely accepted but which are hardly implemented in practice by any States. In this connection, it is perhaps appropriate to note that the major deficiency in the present situation does not arise so much from the absence of generally accepted principles as from the non-existence of any organization or arrangement which actively promotes and encourages the measures needed to apply the agreed principles or which provides the required incentives for implementation or the facilities and services for monitoring measures taken or the effects of such measures. While such machinery can be established by a treaty instrument which would be legally binding, a treaty is not necessary for its establishment and operation. And, as explained earlier, a treaty for this purpose will, probably, not be in place for quite a long time.

Advantages of a Non-Treaty Instrument

47. The advantage of a non-treaty instrument is that it can be developed, adopted and brought into force and operation in a relatively short time; and States could decide to participate in it and utilise its institutions and facilities without having to go through the complicated constitutional and parliamentary procedures usually involved in the consideration and ratification of treaties.

48. Such a non-treaty instrument could be adopted or promulgated in the form of a Declaration or Charter by a suitable global body such as the General Assembly of the United Nations or a special conference convened by either the General Assembly or the Governing Council of UNEP. Since it would not be subject to formal acceptance or ratification, the instrument could be brought into operation at a predetermined date - a date which would be fixed by the adopting body after making allowances for the time needed to enable States and the international community to put the necessary administrative structures and facilities in place.

49. The idea of a non-treaty instrument providing the "constitutional" framework for an international programme is not as novel as it appears. For example, the United Nations Environment Programme (UNEP) which has been behind most of the practical measures and projects initiated within and through the United Nations system was established, not by a "treaty", but by a resolution of the United Nations General Assembly. (General Assembly resolution 2997 (XXVII) of 15 December 1972.

50. The resolution, together with many others adopted by the General Assembly from time to time, has sufficed to enable UNEP to perform a variety of functions in a way not significantly different from the way in which most of the specialized agencies work. Indeed it is at least arguable that UNEP might not have been able to undertake some of its major projects as effectively and as expeditiously as it has done if it had been obliged to operate under a "Constitution" based on a treaty at all events, it appears incontestable that it would not have been possible for UNEP to be established and made operational in the short time it actually took, if the treaty method had been used.

51. It is also worth recalling that a number of important blue-prints in the field of environmental protection have been adopted and promulgated not by means of treaty instruments but by declarations or resolutions of competent international bodies. Examples of major declarations or principles or general procedures are:

(a) the 1972 (Stockholm) Declaration on the Humal Environment (adopted by the United Nations Conference on the Human Environment);

(b) The Vancouver Action Plan for the Human Settlement (which led to the establishment of the United Nations Centre for Human Settlements-HABITAT); and

(c) The 1982 World Charter for Nature, adopted by the General Assembly of the United Nations.

Components of a non-treaty instrument.

52. A non-treaty instrument for the protection of the marine environment against land-based sources of pollution could consist of two parts, namely:

(a) A formal statement of principles, including the rights and obligations of States and other entities and undertakings and commitments by States, individually and collectively, to take the measures necessary to implement those principles in respect of activities undertaken within their national jurisdictions. Such principles could be based on, or distilled form the existing conventions and declarations (regional and global) on the subject, with such refinements or reformulations as may be deemed necessary or desirable; and

(b) An "Action Plan" establishing a programme of action and an institutional machinery for undertaking or coordinating the various component projects and activities.

53. An Action Plan for the protection of the marine environment against pollution from land based-sources would need to address all the problems which are not dealt with adequately or at all in the existing conventions on the subject. It would also establish a suitable institutional machinery to direct and coordinate the measures, activities and projects to be undertaken at the national, regional and global levels. Such a machinery would include inter alia a high-level intergovernmental body (similar to the "Commissions" established under some of the Regional conventions). This intergovernmental body would be required to provide the political, legal and administrative support for the scheme. It would have the mandate and authority to adopt, recommend and promote the implementation of programmes and projects for translating the principles of the instrument into practice. It would also develop the political consensus needed to generate maximum acceptability and support for any such programmes and projects. Finally the high level intergovernmental body would devise the means for procuring, and the procedures and criteria for disbursing, the financial resources to provide incentives and practical assistance to States in order to enable all participants to take the measures required within their national jurisdictions or in their regions. These measures would include:

(a) the development of new and cleaner technologies;

(b) the promotion and refinement of procedures and mechanisms for regulating activities likely to result in pollution such as "command and control" mechanisms;

(c) the introduction or strengthening of economic instruments to encourage or impose more environmentally sound procedures and processes;

(d) the transfer of technologies between the developed and developing States, together with information and advice on possible modifications and innovations to meet the special requirements and conditions of different States and particular regions;

(e) human resource development, including the establishment or improvement of educational schemes and training institutions of the national, regional and global levels;

(f) mobilization of support for programmes and strategies to augment the capacity and willingness of intergovernmental funding agencies and private financial institutions to devote more of their resources to the provision of advice and material assistance to States, especially developing countries, in adopting the measures necessary to achieve environmentally sound operations in all relevant activities within their jurisdictions.

54. This intergovernmental body would need to be supplemented by a more technical organ or set of organs and institutions for the development, review and updating of international standards, and procedures and criteria on the basis of which States would be expected to establish the laws, regulations and machinery to regulate and control activities, projects and processes in order to prevent reduce or control pollution which might result therefrom. Because the sources of pollution from land are many and diverse, any mechanism for establishing standards for their control and regulation must be

inter-disciplinary in nature and multi-faceted in orientation. It would also have to involve, and rely heavily on, existing agencies and programmes within and without the United National system which have interests or experience in the protection and preservation of the marine-environment, or the global environment in general. This could be achieved through the maintenance and strengthening of cooperation with existing inter-agency institutions for coordination, such as the United Nations Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) and the Earthwatch Programme by which UNEP, with the cooperation of various intergovernmental and non-governmental organizations, coordinates a wide range of networks for collecting, storing and dissemination of information and the publishing of trends, assessments and guidelines based on the information and data available.

55. The standards and procedures developed through such a mechanism would be those considered to be necessary or suitable for global application. However they would not necessarily have to be applicable "across the board", and they would, in any case, not be "binding" on any State or group of States. These standards would, in the main, consist of carefully considered technical and related parameters and criteria on activities, processes and substances which could pose significant hazards to the marine environment, together with methods and procedures which might be used with profit to manage and control the activities in question. Such methods and procedures would not only relate to the prevention and control of discharges of pollutants but should preferably also be relevant to all stages of the activities involved, including the conception, design, location and operation of the installations and facilities involved and the management and handling of any by-products and the disposal thereof.

56. Any "global standards" would, of course, have to allow for local (national or regional) deviations, postponement or even replacement in order to take account of local conditions, circumstances and capabilities. International standards which are developed with full awareness of the need to respect regional and national divergencies are less likely to evoke objections or attract criticism that they are intended to, or will in fact, hinder the development of some countries if, as is envisaged, these standards are to be supported by a suitable international arrangement for financial support and technical assistance for their implementation, it is reasonable to expect that they would be acceptable to developing countries as being realistic targets to be aimed at rather than external constraints on their national plans for economic, industrial and social development.

57. On that basis international standards could serve as useful means of ensuring a realistic measure of uniformity in State action based on a common commitment by States to take necessary and appropriate action within their jurisdictions, as part of a collective global effort.

58. A suitable arrangement would also be required for identifying the areas in which special standards and procedures might or should be developed to supplement the global standards in particular States or regions. There might also be an appropriate machinery for the receipt, collation and assessment of information received from States and other interest bodies on measures actually taken or the experience acquired in the taking of such measures. On the basis of such information and relevant data, the appropriate

intergovernmental organs or other bodies would formulate proposals and recommendations for new or revised standards or other practical measures, for consideration by States at the national or international levels.

59. A possible outline of a non-treaty instrument, supplemented by a multi-sectoral Action Plan, is given in Annex 2 to this document.

A Combined Approach

60. It would be possible, should the international community consider it desirable, to combine the two alternative approaches and establish an international arrangement consisting in part of a treaty instrument and partly of a non-treaty instrument. This would involve the adoption of a global Convention or Agreement to be linked with an Action Plan which would not itself be based on a treaty.

61. The global convention would consist of agreed general principles and statements of the undertakings and commitments by States, individually and collectively, to take measures to implement and enforce the agreed principles in respect of activities within their jurisdiction. As in the case of a comprehensive convention, the principles and undertakings might be based on the relevant principles in existing conventions and instruments.

62. The new convention might also institute new global machinery, mainly to coordinate the mechanisms and programmes in the existing regional conventions and, thereby, provide the necessary global dimension to the regional regimes.

63. Such a general convention could be supplemented by an Action Plan on the lines discussed previously. The Action Plan could be developed and approved at the plenipotentiary conference which would adopt the global convention. Formal adoption of the Action Plan could be either by the plenipotentiary conference or could be left to another appropriate intergovernmental body such as the General Assembly or the Governing Council of UNEP.

64. Because such an Action Plan would not be part of the Convention, it would be possible to bring the Plan into operation much earlier than the Convention. Thus, depending on agreement by States and the availability of the resources and facilitates for its implementation, an Action Plan could be made operational on a predetermined date, to be set by the body which adopts it.

65. Again, depending on the will of States, the Action Plan could be conceived either as totally independent of the new Convention (and any institutions created by the Convention) or alternatively as a supplement to the Convention when the latter enters into force. If a completely independent plan is preferred, the Action Plan could operate on its own, drawing inspiration as appropriate from the general principles in the Convention. On the other hand, if it were considered desirable to link the Action plan in some way to the Convention, it might be provided that the Action Plan would operate on an interim basis, pending the entry into force of the Convention. Thereafter the Action Plan would be operated within the framework of the Convention. Such a transitional arrangement could be organized by means of procedures similar to those used in other instruments.

66. As far as the operation of an Action Plan is concerned, it would be possible for the plenipotentiary conference or the General Assembly to establish a new and separate body or Agency to provide the necessary facilities and services. On the other hand, it might be considered desirable and indeed advisable, to entrust the necessary functions to an existing body or agency of the United Nations. In that case, UNEP would appear to be the most appropriate and logical body to be entrusted with such an assignment. It has the constitutional mandate and the requisite experience and expertise, and it has available to it the administrative and professional capacity to undertake the tasks which might be involved in the operation and further development of an Action Plan for the protection and preservation of the marine environment against pollution for land-based sources.

D. CONCLUSIONS

67. There are thus a number of alternative approaches available to the International Community for promoting effective scientific, technical and financial cooperation to protect and preserve the marine environment against pollution from land-based sources. The present situation is clearly inadequate as the rapid deterioration of the coastal environment attests.

68. A major effort can be made to strengthen existing cooperative arrangements which are largely at the regional level and to extend them to regions not already covered. However, many regions lack the resources necessary to plan and implement effective programmes, and will require international scientific, technical and financial support.

69. At the global level, further mechanisms for cooperation might include the development of an instrument on land-based sources of pollution covering all pollutants which enter the seas from land-based activities through all possible pathways. Such a global instrument could take one of three possible forms. It could be either:

(a) A legally-binding convention consisting of general principles and standards etc., together with an institutional machinery for cooperation to implement the principles and standards. This would be subject to ratification or acceptance by States. (Annex I); or

(b) A non-treaty but formally adopted Declaration, Charter or Statute which would not be subject to ratification by States. This would establish an Action Plan which would be entrusted for implementation either to an already existing body or to an institution established specifically for this purpose. (Annex 2); or

(c) A combination of (a) and (b) i.e. a Convention articulating general principles and establishing appropriate international standards, to be supplemented by an Action Plan. The Action Plan would be brought into operation before the Convention enters into force; and it could be operated independently of the Convention. (Annex 3)

70. At the Intergovernmental Meeting of Experts (Halifax, 6-10 May 1991), the working group on economic, social and legal factors summarized the choices by outlining the following possible international approaches:

(i) Agreed principles, initiatives and programmes, building on the existing Montreal Guidelines, to be carried out at the national, regional and global levels, including possible establishment of appropriate standards;

(ii) A formal Declaration, Charter or Statute to be adopted at UNCED;

(iii) A global convention consisting of general principles and standards, together with provisions for institutional machinery for cooperation to implement the convention. The existing Montreal Guidelines, complemented and amended as appropriate, could be used as the basis for the convention.

These options are not necessarily mutually exclusive and could be combined or adopted sequentially.

71. The Halifax meeting did not have time to complete a detailed strategy and action plan on land-based sources of marine pollution for inclusion in Agenda 21, and proposed reconvening before the end of the year to do this in time for review by the fourth session of the Preparatory Committee. It concluded that substantial improvements were needed in the existing legal and institutional framework at global and regional levels, but it did not feel it had the mandate to select among the approaches proposed. However it listed the following basic requirements for effective action to be incorporated into whatever mechanism was adopted:

- build upon the principles of the Montreal Guidelines,

- assign responsibility for coordinating and catalytic functions,

- strengthen regional mechanisms and encourage States to enter into regional agreements,

- provide for exchange of information and the transfer of technologies and other resources,

- provide for more effective data collection and monitoring, and

- develop a timetable for implementation of the selected options.

72. Given the urgency of the critical problem of land-based sources of marine pollution, the effects of which are already widely evident and are expected to worsen considerably in the coming decade, the Preparatory Committee may wish to recommend one or more of the above international options for adoption by the 1992 Conference.

ANNEX 1

Possible Outline of a Global Convention for the Protection of the Marine Environment against Pollution from Land-Based Sources.

1. PREAMBLE

2. DEFINITIONS

3. SCOPE OF APPLICATION

4. GENERAL PROVISIONS

   (a) Undertakings by States to take measures

   (b) Agreement by States to harmonize policies and programmes

   (c) Commitment by States to cooperate for the development of common standards, procedures, criteria etc. in appropriate cases

5. ESTABLISHMENT OF INSTITUTIONAL MACHINERY

   (a) Structure and organization of the Machinery

   (b) Procedure of Membership of the Machinery

   (c) Powers of the respective organs and bodies

   (d) Mandate and responsibilities for

   - the formulation and development of common standards, strategies etc.

   - the taking of collective measures, as necessary

   - the provision of information and assistance to States and entities which need such assistance

   - the procurement and generation of resources (financial, material) to provide incentives and support for action at State, regional or global levels, as appropriate

   - review of the operation and effectiveness of principles, standards and mechanisms with a view to effecting or recommending needed modifications, improvements etc.

6. RELATIONSHIP WITH EXISTING CONVENTIONS OR ARRANGEMENTS DEALING WITH LAND-BASED SOURCES OF POLLUTION

7. RELATIONSHIP WITH OTHER EXISTING CONVENTIONS DEALING WITH MARINE POLLUTION

8. SETTLEMENT OF DISPUTES

9. AMENDMENT PROCEDURES

   (a) Procedures applicable to General Provision

   (b) Procedures applicable to Annexes, Appendices and Common Standards etc. which may be developed under the Convention.

10. FINAL CLAUSES INCLUDING ENTRY INTO FORCE REQUIREMENTS

11. TRANSITIONAL PROVISIONS, IF ANY

12. ANNEXES, APPENDICES ETC.

ANNEX 2

Possible Outline of a Non-Treaty Instrument of International Cooperation for the Protection of the Marine Environment Against Pollution from Land-based Sources.

(To be adopted as a Resolution, Declaration, Charter or Statute)

1. PREAMBLE

2. DEFINITIONS

3. SCOPE OF APPLICATION

4. GENERAL PROVISIONS, INCLUDING STATEMENTS ON THE RIGHTS AND DUTIES OF STATES, CORPORATE BODIES AND INDIVIDUALS REGARDING THE PROTECTION AND PRESERVATION OF THE MARINE ENVIRONMENT

5. GENERAL UNDERTAKINGS AND COMMITMENTS OF STATES REGARDING THE TAKING OF MEASURES, HARMONIZING OF POLICIES AND COOPERATION FOR THE EFFECTIVE ENFORCEMENT OF COMMON STANDARDS RULES AND CRITERIA AT NATIONAL REGIONAL AND GLOBAL LEVELS, AS APPROPRIATE

6. ESTABLISHMENT OF INSTITUTIONAL MACHINERY (OR DESIGNATION OF AN EXISTING AGENCY OR BODY) TO PROVIDE THE EXECUTIVE AND ADMINISTRATIVE SUPPORT FOR THE IMPLEMENTATION OF THE PRINCIPLES OF THE INSTRUMENT

7. STRUCTURE, FUNCTIONS AND POWERS OF THE INSTITUTIONAL MACHINERY

8. INTERNAL REGULATION AND PROCEDURES OF THE MACHINERY

   (a) OFFICERS

   (b) FINANCES

   (c) STAFFING

9. MANDATE OF THE MACHINERY IN RESPECT OF:

   (a) Formulation of the common standards etc.

   (b) The provision of information or assistance to States and other entities

   (c) Development of joint services and facilities for monitoring, assessment, information and statistical services etc.

   (d) Procurement, generation and disbursement of financial and other resources to encourage, assist and support necessary measures at State, regional and global levels.

10. RELATIONSHIP WITH:

    (a) UNITED NATIONS AGENCIES WITH RESPONSIBILITIES OR ACTIVITIES IN THE FIELD OF MARINE POLLUTION PREVENTION

    (b) OTHER REGIONAL OR GLOBAL INSTRUMENTS AND INSTITUTIONS FOR THE PREVENTION OF POLLUTION FROM LAND-BASED AND OTHER SOURCES.

11. PARTICIPATION BY STATES IN THE MACHINERY

    (a) Formalities and procedures required (if any) for States to participate in the machinery

    (b) Obligations of States which agree to participate

12. DATE OF COMING INTO FORCE/OPERATION

13. PROCEDURE FOR THE MODIFICATION OF THE INSTRUMENT AND RELATED INSTITUTIONS

14. TRANSITIONAL ARRANGEMENTS, IF ANY

15. ANNEXES, APPENDICES ETC.

ANNEX 3

Possible Outline of a Global Convention supplemented by an Action Plan

A. CONVENTION

1. PREAMBLE

2. DEFINITIONS

3. SCOPE OF APPLICATION

4. GENERAL PROVISIONS

(a) Rights and obligations of States and other entities regarding the protection of the marine environment against all land-based sources of pollution

(b) General undertakings by States to take measures necessary to prevent, reduce and control marine pollution from land-based activities within their jurisdiction

(c) Commitment by States to cooperate through global and regional institutions and mechanisms to:

(i) establish common standards, criteria strategies etc.

(ii) develop procedures and programmes to promote and assist measures for the effective implementation of agreed measures at national, regional and global levels

5. AGREEMENT OF PARTIES TO PARTICIPATE IN AND CONTRIBUTE TO AN "ACTION PLAN" FOR INFORMATIONAL COOPERATION

6. RELATIONSHIP OF THE CONVENTION TO THE ACTION PLAN

7. RELATIONSHIP OF THE CONVENTION TO EXISTING CONVENTIONS AND INSTRUMENTS

8. SETTLEMENT OF DISPUTES

9. AMENDMENT PROCEDURES

10. FINAL CLAUSES INCLUDING CONDITIONS FOR ENTRY INTO FORCE

11. TRANSITIONAL PROVISIONS

12. ANNEXES AND APPENDICES

B. AN ACTION PLAN ON COOPERATION FOR THE PROTECTION OF THE MARINE ENVIRONMENT AGAINST LAND-BASED SOURCES OF POLLUTION

1. PREAMBLE, DEFINITIONS, SCOPE OF APPLICATION AND GENERAL PROVISIONS

These could be based on the equivalent provisions of the Convention or could be the same provisions incorporated by reference.

2. INSTITUTIONAL MACHINERY, INCLUDING STRUCTURE, POWER, FUNCTIONS AND PROCEDURES.

These could be the same as the relevant parts of the non-treaty instrument (Annex 2).

3. DATE OF COMING INTO OPERATION OF THE PLAN

This date is to be determined at the time of adoption. This could be a date prior to the entry into force of the Convention, with suitable provisions on the arrangements to be made when the Convention enters into force.

4. PROCEDURES FOR MODIFICATION OR AMENDMENT OF THE PLAN

5. ANNEXES AND APPENDICES

IV. ACTION TAKEN TO IMPLEMENT OR RESPOND TO THE MONTREAL GUIDELINES FOR THE PROTECTION OF THE MARINE ENVIRONMENT AGAINST POLLUTION FROM LAND-BASED SOURCES

Report by UNEP

A. INTRODUCTION

1. At its first session, the Preparatory Committee of the United Nations Conference on Environment and Development (UNCED) invited the United Nations Environment Programme, in cooperation with relevant organizations of the United Nations system, to consider undertaking an evaluation of the 1985 Montreal Guidelines for the Protection of the Marine Environment from Land-based Sources of Pollution, where appropriate, taking into consideration existing regional arrangements.

B. THE MONTREAL GUIDELINES

2. The Governing Council of the United Nations Environment Programme (UNEP), by Section II of decision 13/18 of 24 May 1985, encouraged "States and international organizations to take the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources (developed by the Ad Hoc Working Group of Experts on the Protection of the Marine Environment from Land-Based Sources) into account in the process of developing bilateral, regional and as appropriate global agreements in this field".

3. At its second Special Session in August 1990, the Governing Council, by SSII decision 16, further appealed "to Governments and international agencies and forums to take special steps at the global, regional and national levels to address the serious and growing problems of Land-based sources of Marine Pollution".

4. Pursuant to these decisions of the Governing Council, the Assistant Executive Director, Office of the Environment Programme, addressed two letters, dated 30 September 1987 and 5 September 1990 respectively, to Governments and a number of organizations within and without the United Nations system requesting information regarding the action which had been taken to implement the Montreal Guidelines and other use which had been made of the Guidelines.

5. As at 30 January 1991 replies to the letters had been received from 33 Governments and 38 international organizations. One additional Government provided information at the Halifax meeting. While some of the replies merely acknowledged the receipt of the letters or indicated only that there was no substantive information to report on the subject, most of the replies provided information on measures taken in response to, or based on, the Guidelines. Many of the measures reported had been taken with the specific intention of implementing the Guidelines; but information was also provided on action which had been taken independently but which were, nevertheless, in conformity with the terms and spirit of the Guidelines.

6. The Annex to this report contains summaries of the replies received from Governments and international organizations to the letters of 1987 and 1990. Section A of the Annex gives the information from Governments and Section B contains information provided by international organizations.

7. The Montreal Guidelines were addressed to Governments with a view to assisting them in the process of developing appropriate bilateral, regional and multilateral agreements and national legislation for the protection of the marine environment against pollution from land-based sources. They were prepared on the basis of common elements and principles drawn from existing agreements on the subject, drawing upon the experience gained through the preparation and implementation of these agreements. The principal agreements on which the Guidelines were based included the 1982 United Nations Convention on the Law of the Sea (Part XII), the 1974 Paris Convention for the Prevention of Marine Pollution from Land-based sources, the 1974 Helsinki Convention for the Protection of the Marine Environment of the Baltic Sea Area and the 1980 Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources.

8. In addition to three general sections, the Guidelines have the following substantive sections:

(a) Adoption of measures against pollution from land-based sources;

(b) Cooperation on a global, regional or bilateral basis;

(c) Duty not to transfer or transform pollution from land-based sources;

(d) Specially protected areas;

(e) Scientific and technical cooperation;

(f) Assistance to developing countries;

(g) Development of a comprehensive environmental management approach;

(h) Monitoring and data management;

(i) Environmental assessment;

(j) Development of control strategies;

(k) Pollution emergencies arising from land-based sources;

(l) Notification, information exchange and consultation;

(m) National Laws and procedures;

(n) Liability and compensation for pollution damage arising from land-based sources;

(o) Implementation reports; and

(p) Institutional arrangements.

9. The replies indicate that some of the Sections were utilized as guidelines more than others. The sections which received most attention include the following:

Section 4: Adoption of measures against pollution from land-based sources;

Section 10: Development of a comprehensive Environmental Management approach;

Section 11: Monitoring and data management;

Section 12: Environmental Assessment;

Section 16: National Laws and Procedures.

10. While the drafters of the Guidelines, as well as the Governing Council, recognized that Governments might select from, adapt or elaborate upon the Guidelines, as appropriate, to meet the needs of specific regions, it is also worth noting that the Guidelines were intended to serve as a "broad framework" whose various components were deemed to be closely inter-connected and aimed at a common objective. Therefore, the successful achievement of this objective will depend, to a large measure, on the extent to which coordinated attention is given to all the sections which are or may be relevant circumstances in any country or region. This requires an integrated approach which involves a detailed evaluation of the relevance of each section to the needs of the country or region concerned, and the role which each of the sections can play in the effective implementation of the Guidelines as a whole.

11. An example of such an integrated approval is to be found in the action taken by the Government of Canada in its reaction to the Montreal Guidelines. In February-March 1988, the Government convened a "Canadian Conference on Marine Environmental Quality" in Halifax, Nova Scotia. The purpose of the Conference was the development of "a strategic framework" to ensure a harmonized approach to marine pollution by all levels of the Canadian Government, in the light of the adoption "in principle" of the Montreal Guidelines by Canada.

12. The Intergovernmental Meeting of Experts in Halifax in May 1991 considered further the development of principles for the protection of the marine environment against pollution from land-based sources, taking into account the relevant scientific, social, economic and legal elements. It also initiated the development of proposals for a "Strategy and Action Plan" on the subject for submission to the PREPCOM of UNCED and eventually, to UNCED itself. In developing its ideas and formulating proposals the Halifax Meeting took into account of the extent to which the Montreal Guidelines had been utilized or drawn upon by Governments since the Guidelines were promulgated in 1985. The Halifax Meeting also re-focussed the attention of Governments and international organizations on the Montreal Guidelines, and emphasized the continued relevance and use of the Guidelines to the ongoing search for more effective arrangements and procedures for the prevention, reduction and control of marine pollution from land-based sources.

ANNEX

A. SUMMARY OF REPLIES FROM GOVERNMENTS

AUSTRALIA

1. The Government of Australia continues to play an active role in monitoring land-based pollution in the region.

ALGERIA

2. The Government has taken, and envisages taking a number of measures to prevent marine pollution from land-based sources. These measures included:

(i) treatment of industrial effluents and urban sewage;

(ii) monitoring of marine water quality;

(iii) clean-up of beaches;

(iv) prohibition of discharges into the sea of waste oils and PCB's;

(v) impact studies;

(vi) environment assessment;

(vii) action plans at the national and local levels for cases of accidental pollution;

(viii) setting-up of a marine-park;

(ix) participation in the Long-Term Programme Pollution Monitoring and Research in the Mediterranean (MEDPOL);

(x) legal measures such as the prohibition of the discharge into the sea of used oils and PCB; and

(xi) laws concerning research activities, land use planning and environmental protection in general.

BAHAMAS

3. The Bahamas has a law which deals with the discharge of oil into the sea from land-based sources. Contingency plans for such discharges exist. The Bahamas has a general law empowering the Minister of Health to regulate environmental quality including, inter alia, coastal waters. No specific regulations have yet been promulgated.

BAHRAIN

4. The Government has established an Environmental Protection Committee (EPC) which has provided a national programme for preserving the marine environment from industrial effluent.

5. According to a report by EPC for 1988, 18 industrial effluents from 13 major industries were monitored on a quarterly basis between January and December 1988. The report identified metal treatment industry as the most polluting industry in the country. The report concluded that laws and regulatory legal guidelines were needed to deal with the problems identified.

6. At the beginning of 1990, a ROPME Protocol on the "Protection of the Marine Environment against Pollution from Land-Based Sources" was signed in Kuwait. This Protocol is based on the Montreal Guidelines.

BELGIUM

7. The Government has applied the Montreal Guidelines by signing the "Paris Convention for the Prevention of Marine Pollution from Land-based Sources" on the 4th June 1974. The Convention entered into force on 6 May 1976.

BURUNDI

8. Burundi is taking certain measures to prevent pollution of its fresh waters from land-based sources by:

(i) cleaning up the city of Bujumbura;

(ii) reforesting of rural areas to stabilize soils;

(iii) controlling erosion;

(iv) planning for water resource development; and

(v) conducting studies to monitor water quality in lake Tanganyika.

CANADA

9. The action taken in Canada for the implementation of the Montreal Guidelines has involved global measures, regional measures and purely national measures.

The following global measures were taken:

(a) Canada prepared a framework for an "Arctic Environmental Protection Strategy" for the eight circumpolar nations that will lead to a conference on ministerial level in Finland in spring 1991.

(b) Canada carried out an overview of its coastal zone management based on an OECD analysis.

(c) Canada took part in the work of the Steering Group of the London Dumping Convention.

(d) On the occasion of the Houston Summit Canada along with other summit nations expressed its support for the development of a global strategy on marine pollution from land-based sources.

(e) Canada participates actively in the work of GESAMP. (Sections 5, 8, 10, 13)

10. A major regional measure was the signing of an agreement on the "Conservation of the Marine Environment of the Gulf of Maine". This was signed in December 1989 involving the Government of Canada and the Government of the United States. An additional Ten-Year-Gulf Action Plan was developed in order to preserve the Gulf's ecosystems.

The national measures undertaken include the following:

(a) A proposed framework for the management of marine environmental quality within the federal government has been outlined. This has been based on the Montreal Guidelines. Approval has not yet been given to the framework;

(b) Programmes for long-term environmental monitoring and information management and assessment have been envisaged for the future;

(c) A conservation agreement for the creation of a marine park at the confluence of the Saguenay and St. Lawrence River was concluded in April 1990 between Canada and the United States in order to reduce land-based pollution. (Section 7)

(d) Various harbour and coastal programmes are to be elaborated for long-term sustainable utilization of the respective areas.

(e) A number of Information/data management tools are now in use. These include:

- Fundy/Gulf of Maine/George Bank (FMG) integrated resource system, which serves as an electronic atlas and provides access and overlay capabilities with approximately 50 marine, coastal and terrestrial databases and will be used for the Gulf of Maine Programme.

- Inland Coastal Ocean Information Network (ICOIN), which is used as a network to survey marine activities.

(f) The Canadian Environmental Protection Act and the Fisheries Act are currently being revised in order to extend their scope to the control effluents from pulp and paper mills (Sections 4, 16).

CHILE

(a) Chile has ratified a number of international agreements for the prevention of pollution. In particular Chile has signed the Protocol for the Protection of the South-East Pacific against Pollution from Land-Based Sources. This Protocol applies to any kind of land-based source of marine pollution, such as municipal, household and industrial waste. Parties of the Protocol are obliged to formulate laws in order to control pollution.

(b) Chile adopted a "Basic environmental impact assessment programme" in August 1987. Under this programme any investor using the marine environment is required to prepare a baseline study in order to meet the established norms of water quality. The programme is to be in operation with effect from 21 August 1992.

COSTA RICA

11. Costa Rica has undertaken measures concerning Section 4 "Adoption of measures against pollution from land-based sources", Section 5 "Cooperation on a global, regional or bilateral basis", Section 7 "Specially protected areas", No. 11 "Monitoring and data management" and Section 12 "Environmental assessment". Costa Rica is also undertaking action according to Section 10 "Development of a comprehensive environmental management approach", Guideline Section 13 "Development of control strategies", Section 14 "Pollution emergencies arising from land-based sources and Guideline No. 16 "National laws and procedures".

CUBA

12. Priority has been given to a study on the current state of pollution of the main bays, which are believed to be the areas most affected. This action is in accordance with Section 2 of the Montreal Guidelines: "Basic obligation".

CYPRUS

13. Has signed the Athens "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources", of 1980 which is in accord with the Montreal Guidelines.

DENMARK

14. Prior to the adoption of the Montreal Guidelines, which have so far not been implied into Danish marine policy, Denmark signed the Convention on the Protection of the Marine Environment of the Baltic Sea (1972) and the Convention for the Prevention of Marine Pollution from Land Based Sources (1974).

EGYPT

15. Egypt has drafted a law of marine environment protection, which is to be submitted to the ministerial cabinet. Particular attention is drawn to the third chapter of the draft which deals with shops, companies, industrial institutions or touristic activities as land-based sources. This law was prepared within the framework of the Montreal Guidelines.

FIJI

16. Although the principles applied recently in Fiji for the protection of environment including marine environment do not make specific reference to the Montreal Guidelines, they are consistent with the Guidelines, in particular with Section 12 "Environmental Assessment", Section 7 "Specially protected areas" and Section 16 "National Laws and procedures". Fiji intends to become

a Party to the Convention for the Protection of the Marine Environment of the South Pacific Region, whose purposes coincide with Section 5 "Cooperation on a global, regional or bilateral basis".

FINLAND

17. In the early 1970's the government of Finland took the initiative for an agreement on the protection of the marine environment of the Baltic Sea from pollution from all sources, including pollution from land-based sources. The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) was signed in 1974, prior to the adoption of the Montreal Guidelines, by all Baltic Sea States (Denmark, Finland, the German Democratic Republic, the Federal Republic of Germany, Poland, Sweden and the Union of Soviet Socialist Republics). Finland is an observer to the Convention for the Prevention of Marine Pollution from Land-based Sources, 1974 (Paris Convention).

FRANCE

18. As a Contracting Party to the "Paris Convention for the Prevention of Marine Pollution from Land-based Sources" (1974) as well as to the "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" (Athens, 1980), a signatory of the "United Nations Convention on the Law of the Sea" 1982, and in implementing "EEC directions relating to discharges of dangerous substances into the marine environment", France has been applying the principles enunciated in the Montreal Guidelines.

19. In the detailed report on its national legislation concerning the marine environment France emphasized that except in cases where pollution is directly discharged into the marine environment, all sources of marine pollution are land-based and therefore its domestic law does not include any texts specific to land-based marine pollution.

20. The approach of France in controlling waste disposal activities is to treat environmental protection in a comprehensive manner. France intends to regulate activities at the source of pollution and not in a piecemeal fashion based on the protection of a particular area. Establishments which are classified under domestic law as needing pollution control permits are required to declare the particular risks they pose for the aquatic environment, their locations vis-à-vis surface water and drains and the conditions for their use, treatment and discharge of waters and other emissions as well as for the removal of operational wastes and residues. In the event of a major change in operating conditions the whole procedure must be repeated.

The measures outlined above addressed almost all the Guidelines.

GERMANY

21. As a Contracting Party to the "Paris Convention for the Prevention of Marine Pollution from Land-Based Sources" (1974) as well as to the "Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area" (1974), on which the Montreal Guidelines are largely based, Germany has implemented the principles of the Montreal Guidelines in its national legislation.

GUATEMALA

22. In 1986 Guatemala adopted legislation aimed at the promotion and development of research and monitoring of the water of the exclusive economic zone and investigation and control of pollution of rivers, lakes and seas, in conformity with Section 11 "Monitoring and Data Management", Section 2 "Adoption of Measures against pollution from land-based sources" and Section 16 "National laws and procedures") as well as Section 4 and 16. A national contingency plan to combat oil spills is being prepared by the National Environment Commission in line with Guideline No. 14 "Pollution emergencies arising from land-based sources". The Government will use the Montreal Guidelines when preparing the contingency plan and in preparing a general law on water.

INDIA

23. The Guidelines are useful and comprehensive and will be used for framing regional programmes for the control of coastal pollution from land-based sources when the need arises. India has surveyed and inventoried land-based sources of pollution along the entire coastline which has resulted in a scheme of classification of coastal waters based on best use. Reference is also made to the Water Act of 1974 which has provisions relating to permits, as provided for in the Guidelines.

MALAYSIA

24. Malaysia practices control strategies based on emission standards as well as environmental planning, consistent with Section 13 "Development of Control Strategies" Section 10 "Development of a comprehensive management approach" and Section 16 "National laws and procedures". Malaysia also uses the environmental quality standards from other countries, pending the development of appropriate standards by Malysia itself.

MEXICO

25. Mexico has recently adopted a general law on environmental protection which gives the Government the task of ensuring that pollution originating from national territory does not affect the environment of other states, in line with Section 3.

26. In conformity with Section 4 "Adoption of measures against pollution from land-based sources", Section 13 "Development of Control Strategies" and Section 16 "National laws and procedures", Mexico is taking measures to control all discharges into waterways and the soil by requiring them to meet certain standards. Licences will be required for discharges into the territorial sea or exlusive economic zone.

27. In accordance with guideline Section 5 "Cooperation on a global, regional or bilateral basis", the Government considers it important to cooperate within the framework of the Plan of Action for the Caribbean Environment Programme and to consider the adoption of a protocol on the subject.

NETHERLANDS

28. The Netherlands has for more than 10 years been a Party to, and implemented, the "Paris Convention on the Prevention of Marine Pollution from Land-based Sources" on which the Montreal Guidelines are largely based. To implement the Paris Convention, national legislation has been passed. Assessment of policy objectives for the enforcement of this legislation has, to large extent, used the Montreal Guidelines.

NIGERIA

29. Nigeria is taking action on the Montreal Guidelines, including the development of national guidelines for the protection of the marine environment from pollution by land-based sources.

TUNISIA

30. Tunisia intends to prepare national guidelines for the protection of the marine environment from pollution by land-based sources, taking into account the Montreal Guidelines.

NORWAY

31. As a contracting party to the "Paris Convention for the Prevention of Marine Pollution from Land-based Sources" Norway has implemented the Montreal Guidelines.

PAKISTAN

32. Pakistan fully supports the Guidelines. The Ministries, Divisions and Agencies are instructed to act in accordance with the Guidelines. A draft Standard Operating Procedure (SOP) has been prepared to control marine and emergency pollution within Pakistan's territorial waters.

PHILIPPINES

33. Philippines has made use of the Montreal Guidelines in adopting policies, legislation, rules and regulations concerning environmental protection. The Philippines is aware of the importance of the Montreal Guidelines and would welcome additional technical assistance from UNEP for their implementation.

SAUDI ARABIA

34. The Regional Organization for the Protection of the Marine Environment (ROPME) of which Saudi Arabia is a Member State, is preparing a Protocol for the Protection of the Sea Area Against Pollution from Land-based Sources. This document is expected to be consistent with the Montreal Guidelines.

SENEGAL

35. A regional project to monitor pollution of the marine environment of West and Central Africa has been established in 1985 to work on:

- bacteriological analysis of coastal waters and marine organisms;

- analysis of metal, organchlorides and oil hydrocarbons in marine organisms;

- observation and analysis of oil spills and tar.

36. In relation to this project workshops and a seminar were held for evaluation. The Directorate of Environment of the Ministry of Tourism and Nature Protection has initiated a master plan for the rehabilitation, protection and development of Dakar Bay. In this regard a legal framework for the protection of bays will be elaborated.

37. The Directorate, in cooperation with IMO has established a national emergency plan in case of accidental pollution by hydrocarbons and/or toxic chemicals.

THAILAND

38. Thailand has legislation which makes it an offence to dump substances which are polluting or harmful to marine life or navigation into waterways, including territorial waters, which are to be used for the public good.

TURKEY

39. Turkey is a Contracting Party to the "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" (Athens, 1980), The implementation of the Protocol will be in line with Section 10 "Development of a comprehensive environmental management approach", Section 11 "Monitoring and data management, Section 12 "Environmental Assessment", Section 13 "Development of control strategies" and Section 16 "National laws and procedures".

40. Studies relevant to the harmonization of the Montreal Guidelines and national legislation are in progress.

USSR

41. The USSR proposed the use of the principles of the Montreal Guidelines in both the Protocol on Prevention of Marine Pollution from Land-Based Sources to the regional Convention on the Protection of the Black Sea against Pollution, and the Framework Convention on the Protection and Use of Transboundary Watercourses and International Lakes which was developed in the Economic Commission for Europe (ECE).

USA

42. According to Section 2 of the Montreal Guidelines, the United States of America meets the basic obligations of the Montreal Guidelines through a number of its statutes in addition to the international agreements to which it is party.

Federal Statutes include the following:

- The Ocean Dumping Act;

- The Act to prevent pollution from ships as amended by the Marine Plastic Pollution Research and Control Act;

- The Federal Water Pollution Prevention and Control Act (Clean Water Act);

- The Clean Air Act;

- The Oil Pollution Act.

43. The United States control strategies are embodied in national legislation to control point and nonpoint sources of pollution and to respond to discharges of oil and hazardous substances under the Clean Water Act, as well as through coastal zone management programmes and the National Estuary Programme.

44. The Clean Water Act (CWA) first regulates all pollution from point sources. The main provision of the CWA relates to the National Pollution Discharge Elimination System (NPDES) which requires an NPDES permit for all point sources discharging wastewater into navigable water. From this wastewater 85 per cent of the suspended solids and biochemical oxygen in the sewage are removed. The disposal of sludge is also covered. For industrial wastewater the best available technology is required in order to avoid toxic substances to enter into the water. Ocean discharges even require an evaluation of the impact on marine ecosystems in order to receive the NPDES permit.

45. Concerning cooperation on a global, regional or bilateral basis (Section 5) the United States have signed the following agreements:

- UNEP Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region ("Cartagena Convention");

- The Intergovernmental Oceanographic Commission (IOC/UNEP Programme on Marine Pollution Assessment and Control for the Wider Caribbean (CEPPOL);

- The Specially Protected Areas and Wildlife (SPAW) Protocol for the Wider Caribbean Region;

- The Great Lakes Water Quality Agreement (with Canada);

- The Gulf of Mexico Programme;

- The Gulf of Maine Programme.

46. The duty not to transfer or transform pollution from land-based sources as stated in Section 6 of the Montreal Guidelines is met through:

- The Gulf of Maine Programme;

- The Gulf of Mexico Programme;

- The Ocean Dumping Act which applies to the transport of material from any location to the dumping place which could be any territorial sea or US contiguous zone affecting the territorial sea;

- The Marine Sanctuaries Programme and Estuarine Research Reserves under which protected areas and reserves are established.

47. The United States is inter alia, working for the recognition of the Gulf of Mexico and the Wider Caribbean Region as a special area under Annex V of MARPOL.

48. Scientific and technical cooperation (Section 8 of the Montreal Guidelines) is addressed e.g. through the Cartagena Convention by providing technical assistance, coordinating research and monitoring with the other parties.

49. Assistance to developing countries (Section 9 of the Montreal Guidelines) is given through the joint US/Yucatan ECO tourism project in Yucatan/Mexico.

50. The development of a comprehensive management approach (Section 10 of the Montreal Guidelines) is mainly based on the Clean Water Act with the following associated programmes:

- The National Estuary Programme (NEP) requires for each estuary a specific programme that has to develop within 5 years, a plan to address the area's pollution. The NEP provides partnership between state governments, federal agencies, local governments, citizen, user groups and others to approach the specific problems in a comprehensive conservation and management plan (CCMP) by binding participants of this plan to specific financial institutional and political commitments. Furthermore the NEP gives the necessary management and regulatory tools to deal with the coastal problems;

- The Great Lakes Programmes focuses on the control of toxic chemicals and airborne depositions;

- The Gulf of Mexico Programme's main objective is to develop a strategy for managing and protecting the resources of the Gulf. Serious problems are created by the rapid loss of natural habitat, the wetlands, aquatic vegetation, seagrass beds.

51. Monitoring and data management (Section 11) are undertaken by the US Environmental Protection Agency and the National Oceanic and Atmospheric Administration. They include various information systems.

52. Environmental assessment (Section 12) is provided through the National Environmental Policy Act (NEPA), the Clean Water Act and the Coastal Zone Management Act.

53. Pollution emergencies (Section 14) is obviated by the CWA, the Spill, Prevention, Containment and Counter Measures (SPCC) Plan and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The problem is also addressed in the different programmes associated with the Clean Water Act.

54. The United States works within the Cartagena Convention for the adoption of liability and compensation rules for pollution damage (Section 17).

55. Such rules are already elaborated in a framework in the Comprehensive Environmental Response Compensation and Liability (CERCLA) and The Oil Pollution Act 1990.

56. The Environmental Protection Agency through its National Coastal and Marine Policy focuses, inter alia, on control of pollution from land-based sources through the following objectives:

(a) To identify and implement protective measures through State Nonpoint Source Management Programmes;

(b) To introduce filter strips which reduces sediments and other pollutants;

(c) Permits for point sources as well as for new sources to coastal waters will only be issued after the impact of the discharge on the marine ecosystems has been cleared;

(d) To determine the effects of in-place toxic pollutants as well as that of atmospheric deposition of nutrients and toxics. Another responsibility of the EPA is the limitation of habitat degradation and loss caused by pollution through establishing e.g. sanctuaries and wetlands and the reduction of accidental releases of pollutants by strengthening the National Contingency Plan.

VENEZUELA

57. Venezuela in undertaking activities for combating pollution from land-based sources. The Government has taken account of relevant sections of the Montreal Guidelines specifically Section 5 "Cooperation on a global, regional or bilateral basis", Section 10 "Development of a comprehensive environmental management approach", Section 13 "Development of control strategies", Section 14 "Pollution emergencies arising from land-based sources" and Section 16 "National laws and procedures" The Guidelines were also taken into account in action relating to the handling of pollution caused by oil spills.

YEMAN ARAB REPUBLIC

58. The Montreal Guidelines will be discussed in the Environmental Protection Council.

YUGOSLAVIA

59. Yugoslavia has signed the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution, but has not yet signed the related Protocol for the Protection of the Mediterranean Sea against pollution from land-based sources.

60. An agreement with Italy on cooperation in the protection of the waters of the Adriatic Sea and coast against pollution (1979) has been ratified by the Government.

[N.B. The reply from Yugoslavia also transmitted copies of two papers entitled, respectively, "Environmental management Policies - Problems, Solutions and Needs of the Mediterranean countries" and "Integration of the Environment into Coastal Zone Management". The later paper which had been presented to an OECD Environmental Committee", gives an overview of the country's environmental policy.]

B. SUMMARY OF REPLIES FROM INTERNATIONAL ORGANIZATIONS

African Development Bank (ADB)

61. The ADB regards the Montreal Guidelines as a valuable document of well-structured recommendations for the use in the banks projects as well as a background document during dialogue with governments. The ADB intends to continue using the Guidelines in all relevant projects and programmes.

Asian Development Bank (ADB)

62. The Asian Development Bank has developed a number of Environmental Guidelines covering the marine environment and is creating Guidelines for coastal zone development. The principles of both coincide with the Montreal Guidelines.

Commission of the European Communities (EEC)

63. In most cases the principles of the Montreal Guidelines coincide with those which EEC employs.

The Council on Ocean Law

64. The Council is making use of the Montreal Guidelines in preparing for the implementation of the Cartagena Regional Seas Agreement for the Caribbean (1983), one of whose priorities is to develop a protocol on land-based pollution.

European Investment Bank (EIB)

65. The Montreal Guidelines provide a sound reference point for the activities of EIB this field. The Bank is supporting and financing various projects aimed at preventing marine pollution from land-based sources, e.g.: improved treatment, collection and discharge of pollutants; reception

facilities; limitation of waste heat disposal from coastal thermal power-plants; dust-proof design of coal-unloading and handling facilities in harbours; chemical control of waste waters and erosion control.

Food and Agriculture Organization of the United Nations (FAO)

66. FAO participated fully in the execution of the Long-Term Programme for Pollution Monitoring and Research in the Mediterranean (MED POL) under the UNEP Regional Seas Programme which is charged with implementing the "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" (Athens, 1980). This correspon's with the Montreal Guidelines. FAO also carried out pollution monitoring activities in the coastal environment of West and Central Africa and is to start a similar project soon in East Africa. Those activities correspond to the Montreal Guidelines, particularly with Section 9 "Assistance to developing countries" and Section 11 "Monitoring and data management".

67. In accordance with Section 4 "Adoption of measures against pollution from land-based sources", FAO has been implementing the "International Code of Conduct on the Distribution and Use of Pesticides" to prevent pollution from agricultural run-offs.

Inter-American Development Bank (IDB)

68. The IDB intends to see to it that the Montreal Guidelines are considered in all investment projects financed by the Bank. The IDB considers the guidelines as a useful checklist and they conform to the IDB's performance record in projects such as urban sewage systems, irrigation systems, harbor and port enhancement, and industrial projects near the marine environment. The Bank reiterates its commitment actively to consider requests from borrowing member countries to strengthen their institutional and technical capacity to manage their marine environment.

Intergovernmental Oceanographic Commission (IOC)

69. The Montreal Guidelines and their principles are widely used within the programme of the IOC, e.g. updating manuals and laboratory work; assistance to standardize different marine matrix which are used for identification and quantification of biological and ecosystem effects of pollution; assistance for research projects integrating coastal zone management. The IOC closely cooperates with UNEP.

International Atomic Energy Agency (IAEA)

70. The IAEA's "Safety Series No. 77: Principles for Limiting Releases of Radioactive Effluents into the Environment" (1986) correspond to the Montreal Guidelines Annex I "Strategies for Protecting, preserving and Enhancing the Quality of the Marine Environment" (para. 1.2.1.3 " as low as reasonably available") and might be regarded as an expansion of it. The principle of its "Safety Series No. 65: Environmental Assessment Methodologies for Sea Dumping of Radioactive Wastes" (1984) was also consistent with the Guidelines Annex I, para. 1.2.1.3.

71. In its work on behalf of the London Dumping Convention, IAEA revised its "Definition of High Level Radioactive Waste Unsuitable for Dumping At Sea" and its recommendations pertaining to the dumping of radioactive wastes (Safety Series No. 78 (1986)). The purpose of the Definition was to assign particular types of radioactive waste to a category in which dumping is prohibited, analogous to the Black List in Annex II of the Montreal Guidelines.

International Institute for Environment and Development (IIED)

72. The IIED has used the Montreal Guidelines in work on the development of the Antarctic minerals regime, particularly Section 19 "Institutional arrangements" and Section 11 "monitoring and data management".

International Maritime Organization (IMO)

73. IMO will continue to make every effort to assist countries in developing instruments for the protection against pollution. Reference will be made to the Montreal Guidelines in all appropriate cases.

Organization for Economic Cooperation and Development (OECD)

74. The OECD is planning to work on coastal zone management in 1989, and any such project will take full account of the Montreal Guidelines.

Organization of American States (OAS)

75. The Executive Secretariat for Economic and Social Affairs, as well as its Executive Secretariat for Education, Science and Culture would make use of the guidelines.

Permanent Commission of the South Pacific (CPPS)

76. The CPPS has used the Montreal Guidelines in the preparation and development of the South-East Pacific Action Plan especially in the formulation of:

(a) the Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific;

(b) the Agreement on Regional Cooperation in Combating Pollution of the South-East Pacific by Oil and Other Harmful Substances in Cases of Emergency;

(c) the Supplementary Protocol to the Agreement on Regional Cooperation in Combating Pollution of the South-East Pacific by Oil and Other Harmful Substances in Cases of Emergency; and

(d) the Protocol for the protection of the South-East Pacific against Pollution from Land-based Sources.

77. The CPPS will use the Guidelines also for the development of two other protocols on specially protected areas of the South-East Pacific and on environmental impact assessment.

Transport and General Workers Union (TGU)

78. The Montreal Guidelines contain comprehensive provision for the protection of the marine environment but the "voluntary" nature of the Guidelines did not adequately address the dangerous situation created by uncontrolled disposal of toxic wastes which can be the source of marine pollution when improperly disposed of on land.

United Nations Department of Technical Co-operation for Development (DTCD)

79. Special attention has been to the Guidelines in all DTCD projects. DTCD's strategy on protection of marine and coastal environments includes: advising governments by recommending to incorporate special environmental clauses in their national laws, e.g. they assist countries in changing their mining law for prevention of acid and waste entering rivers. Furthermore they focus on environmental training for government personnel, monitoring water quality as well as soil erosion and flood protection programmes. In this regard DTCD examines the living conditions in coastal areas by planning for and investigating adverse effects of beach erosion, typhoon and monsoon surges in South-East Asia.

80. Other programmes are concerned with the restoration of inland lakes, rivers and coastal zones including the pollution load from nearby major cities, by handling polluted water drained from irrigated lands in upper catchment areas and studying inexpensive pollution control methods for city use. Several Seminars related to some of the above mentioned issues were to be held during 1990.

United Nations Development Programme (UNDP)

81. UNDP considers the Guidelines to be useful in broadening understanding of the far-reaching effects of land-based activities in altering marine ecosystems which local governments should take into account in their decisions. It UNDP's practice is to raise the issues of environmental impact with all parties in any UNDP-assisted project and it uses the guidelines especially when preparing project documents. The role of UNDP is to monitor if environmental guidelines are observed by the implementing agencies as agreed upon in the project document, and to take action accordingly.

United Nations Economic Commission for Africa (ECA)

82. No action has so far been taken with regard to the application of the Montreal Guidelines. If resources improve ECA will endeavour to promote their use.

United Nations Economic Commission for Europe (ECE)

83. The ECE has started a number of relevant activities, including:

(a) The Adoption in 1988 of the "Regional Strategy for Environmental Protection and Rational Use of Natural Resources" which deals both with the prevention of pollution of the sea, near-by shore marine environments and air as well as development of programmes and guidelines on marine and coastal protection.

The instruments for achieving these goals are:

- bilateral or multilateral treaties

- strengthening existing international agreements and encouraging new ones

- ECE cooperation in the elaboration of guidelines on coastal protection.

(b) The Principles regarding "Cooperation in the Field of Transboundary Waste" - adopted by ECE in 1987 - are now leading to a "Framework Convention on the Protection and Use of Transboundary Water Courses and International Lakes". This Convention refers to Sections 4 and 5 of the Montreal Guidelines and addresses both the regional and subregional levels. Besides the protection against pollution, the Convention treats the question concerning responsibility and liability for transboundary marine pollution.

(c) An ECE Seminar on Waste-water management was organized in 1990. This resulted in a number of recommendations, such as precautionary measures for hazardous substances, waste-water minimization at source. Furthermore the Seminar will contribute to Guideline No. 6 on "Regional Strategy on Integrated Waste management".

(d) Evaluation of data related to airborne pollution of the Baltic Sea, the Black Sea, Mediterranean Sea and the North Sea (Section 16).

(e) An ECE Seminar on ecosystems approach to water management regarding the protection of surface waters will be held in May 1991 in Oslo. Legislative, administrative and economic measures are taken into account (Section 10).

(f) A "Convention on Environmental Impact Assessment in a Transboundary Context" is to be signed from 25.2.91. The Convention arranges for the application of Environmental Impact Assessment (EIA) in order to prevent pollution with transboundary impact (Section 12).

(g) Work programmes for the protection of inland water and water resources against agricultural pollution and for the application of water-quality criteria operate in order to develop instruments against pollution (Section 13).

(h) Together with UNEP the ECE has adopted the Code of Conduct on Accidental Pollution by Transboundary Waste (1990) which should lead to a final Convention on Transboundary Impacts of Industrial Accidents (Section 14).

(i) Guidelines have been prepared on responsibility, liability and compensation in case of transboundary water pollution (Section 17).

United Nations Economic Commission for Latin-America and the Caribbean (ECLAC)

84. The appropriate secretariat units of ECLAC will take the Montreal Guidelines into account in their activities.

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

85. ESCAP has prepared a study for the development of a "Coastal Environmental Management Plan" (CEMP) for Bangladesh (1987) which conformed to Section 9 "Assistance to developing countries" and Section 10 "Development of a comprehensive environmental management approach". ESCAP has also completed similar CEMP programmes for Sri Lanka (1985) and Thailand (1986), and initiated a study for the Development of an Environmental Management Plan for Tonga.

United Nations Educational, Scientific and Cultural Organization (UNESCO)

86. The Montreal Guidelines were referred to and used as appropriate in activities in which UNESCO's Intergovernmental Oceanographic Commission participates as a cooperative partner.

UNEP: Coordinating Unit for the Mediterranean Action Plan (MEDU)

87. At a meeting of Mediterranean experts on the preparation of an off-shore protocol, a Draft Protocol on the prevention of Pollution from off-shore operations was prepared for submission to the Bureau of the contracting parties' session.

88. The Mediterranean Action Plan has been further elaborated and adjusted to meet current needs. Consideration to be given to this matter every two years at the Governmental meetings of the Contracting Parties.

88. The black and grey lists of substances are to be adopted by the Contracting Parties in accordance with the calendar (1986-1995). Full implementation of the land-based sources protocol (1980) is expected by the year 2000.

United Nations Industrial Development Organization (UNIDO)

89. The UNIDO secretariat will take the Montreal Guidelines into consideration during the implementation of relevant activities.

World Bank (IBRD)

90. The Bank has developed its own internal Guidelines concerning marine and coastal pollution. These internal Guidelines are based on the Montreal Guidelines.

World Health Organization (WHO)

91. WHO published the full text of the Montreal Guidelines in the "International Digest of Health Legislation" (IDHL 1985, Vol. 36, No. 4, pp. 1090-1109) as well as an article on the background to and scope of the Guidelines (IDHL 1986 Vol. 37, No. 2, pp 391-394) in order to assist in their dissemination.

World Meteorological Organization (WMO)

92. WMO uses the principles laid down in the Montreal Guidelines, in particular Section 11 "Monitoring and data management", in the framework of the "Convention for the Protection of the Mediterranean Sea against Pollution". Under this Convention, WMO coordinates research and monitoring activities aimed at assessing land-based pollutants which are transported through the atmosphere to the sea.

World Tourism Organization (WTO)

93. The Montreal Guidelines were circulated to the Technical Corporation Staff of World Tourism Organization so that account can be taken by the staff in briefing experts.

Five organizations, namely:

The United Nations High Commission for Refugees (UNHCR);

The International Labour Office (ILO);

The General Agreement on Tariffs and Trade (GATT);

The World Food Programme (WFP);

The World Intellectual Property Organization (WIPO);

reported that the Montreal Guidelines were outside their fields of competence.